

TRIPLECTIDES OF AUSTRALIA
(INSECTA: TRICHOPTERA: LEPTOCERIDAE)

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Abstract

The caddisfly genus *Triplectides* is revised for Australia, with descriptions and keys provided for males of all 26 Australian species and subspecies and for females of the 18 species for which the sexes have been associated. Ten species and one subspecies are described as new to science. *T. cephalotes* and *T. gilolensis* probably do not occur in Australia and should be removed from its faunal list. Five closely related species, *T. australis*, *T. helvolus*, *T. magnus*, *T. parvus* and *T. volda*, are viviparous. The typical size of the compound eyes of southern males of *T. similis* often is twice that of northern males; the eye size ranges do not overlap although the forms are broadly sympatric, suggesting a single-gene variation in this character.

Introduction

Ulmer (1907) and Mosely (1936) provided the latest comprehensive revisions of the long-horned caddisfly subfamily Triplectidinae. Scattered publications since 1936 have brought the number of species to 82 in 14 genera. About half of these species (43) have been included in the nominal genus *Triplectides*. Mosely and Kimmins (1953) published the most recent review of Australian *Triplectides*, indicating 15 species and one subspecies in its fauna. Since then, Neboiss (1977) synonymised *T. dubius* Mosely (but, strictly speaking, not *T. dubius subalbidus* Kimmins) with *T. elongatus* Banks, transferred *T. albanus* Mosely to *Westriplectes* (Neboiss, 1982), and described 4 new species (Neboiss 1977, 1982). In this work, we remove *T. cephalotes* (Walker) and *T. gilolensis* (MacLachlan) from the list of Australian species, synonymize *T. dubius subalbidus* with *T. elongatus* and describe 10 new species and one new subspecies, bringing the total to 25 species and 1 subspecies of Australian *Triplectides*.

The original plan for this work as envisaged by the late Dr Herbert H. Ross and JCM was to infer the phylogenetic history for the species of Triplectidinae, facilitating resolution of questions concerning their most appropriate tribes and genera and permitting a reconstruction of their historical, transantarctic distributions. Our revision here represents the first stage

toward those goals. Subsequent stages will include our revision of the remaining species of Australian triplectidines, a study of extra-Australian species, and, finally, the phylogenetic treatment with its reassessment of triplectidine tribes and genera and their historical biogeography.

The different species of *Triplectides* occur in a wide variety of ecological conditions, including cold and warm, unpolluted to moderately polluted, permanent and temporary lakes, ponds, rivers and creeks. Apart from 3 Baltic Amber fossils, the various species of this genus are distributed in Asia from India to Japan; in Indonesia, Papua-New Guinea, and Australia south to Tasmania; on South Pacific Islands including New Hebrides, New Caledonia, and New Zealand; and in South and Central America. The genus is ubiquitous in Australian waterways, including even temporary aquatic habitats in the centre of the continent, and is often the most common caddisfly genus encountered in benthic surveys.

Morphological terminology used in this work is patterned after the studies by Nielsen for male (1957) and female (1981) caddisfly genitalia and by Betten (1934) and Hamilton (1972) for wing venation.

During the course of our study, we examined specimens from the National Museum of Victoria in Melbourne (NMV), the B.P. Bishop Museum in Honolulu (BPBM), the Austra-

lian National Insect Collection in Canberra (ANIC), the University of Queensland Insect Collection in Brisbane (QU), the Queensland Museum in Brisbane (QM), and the Australian Museum in Sydney (AM). Types of species described herein are deposited in these institutions or in the British Museum of Natural History in London (BMNH) or Institut für Pflanzenschutzforschung, Eberswalde (IPE), formerly Deutsches Entomologisches Institut (DEI), Berlin as indicated.

Complete bibliographies, including synonyms, of each of the following taxa described before 1961 can be found in the catalogue by Fischer (1965, 1972). Only the principal taxonomic references are provided below.

All dissected specimens are identified by a note book number with a prefix PT-; wing venation drawings are prepared from detached wings mounted in glycerol as temporary mounts; genitalia are drawn from cleared specimens, macerated in KOH and transferred to glycerol for storage.

The terminology used for wing venation is indicated on Fig. 1, and the following abbreviations have been used:

Longitudinal veins:

C—costa	Cu—cubitus
Sc—subcosta	P—plical
R—radius	E—empusal
S—sector	A—anal
M—media	JB—jugal bar

Crossveins:

s—sectoral
m-cu—medio-cubital
acc m-cu—accessory medio-cubital (Fig. 26)

Other structures:

arc—arculus
ny—nygma
dc—discoidal cell
tc—thyridial cell

Figures 54-82 illustrate male genitalia; each view is indicated by letters a-g respectively; a—left lateral view of genitalia except phallus; b—ventral view of inferior appendages and tip of phallus; b'—same as b except setae and baso-

ventral lobe omitted; c—left lateral view of phallus; d—dorsal view of terga IX and X; e—dorsal view of phallus, more enlarged; f and g—ventral views of genitalia from varieties.

Abbreviations in terminology used are shown in Fig. 54.

ap do—apico-dorsal lobe of inferior appendage
bv—baso-ventral lobe of inferior appendage
har—harpago or second segment of inferior appendage
me lo—mesal lobe of inferior appendage
ph sc—phallosomal sclerite
sup app—superior appendage
X—tergum X

Figures 83-100 illustrate female genitalia showing: a—lateral view, and b—ventral view. Abbreviations of terms used in female genitalia are shown in Fig. 83.

do se—dorsal setose lobe
go pl—gonopod plate
lam—lamella
s-b p—sensilla-bearing process
sp sc—spermathecal sclerite

The scale is indicated by a line representing 1 mm for the entire wing figure and 0.1 mm for male and female genitalia figures, except Fig. 77e.

Triplectides Kolenati, 1859

Triplectides Kolenati, 1859, p. 247.

The diagnostic character for this genus is the apically broadened discoidal cell (dc) in the forewing (Fig. 1), its lower distal angle produced toward the medial vein (M) and, in the males of some species, closely parallel with it for a short distance. The closing sectoral crossvein (s) for this cell is usually curved basad. The thyridial cell (tc) is long and narrow, always longer than the discoidal cell. In some species, the apex of this cell is narrow, or separated from the rest of the cell by an accessory crossvein (acc m-cu Fig. 26) or its anterior and posterior veins may be fused for a short distance. As evidenced by the position of the

nygma (ny), forks 1, 2 and 5 are present in the male forewing; 1, 2, 3 and 5 in the female forewing. In the hindwing, forks 1, 2, 3 and 5 are present in both sexes, except that fork 1 is usually absent in *T. volda* Mosely. The forewing is longer and narrower than the hindwing and usually slightly widened beyond the arculus (arc). The hindwing posterior region is usually broad, especially in males, giving it a somewhat triangular appearance.

Tibial spurs are 2, 2, 2 or 2, 2, 4 on the 3 legs of one side from foreleg to hindleg, respectively.

Diagnostic characters in the male genitalia (Fig. 54) include a pair of superior appendages flexible at the base, more or less fused sclerites on tergum X, a pair of 2-segmented inferior appendages, and an apparently 1-piece phallus, all of whose lengths and shapes vary according to the species. The basal segment of each inferior appendage bears an apico-dorsal, semi-membranous lobe (ap do) which extends beyond the harpago (har), a baso-ventral lobe (bv) which is flexible at its base, and a mesal lobe (me lo) (possibly the 'phallic guide' mentioned by Morse, 1975) which is fused only basally with that of the opposing inferior appendage and which apparently serves as a clasp for the movable harpago. The phallus consists primarily of a tubular phallobase with a large phallotremal sclerite (ph se) in its apico-dorsal membranes. No phallic shield or parameres are present. A long, more-or-less sclerotized strip extends along the dorsal midline from the phallic apodeme to the apex, supported by partially eversible membranes, and may represent the primitive phalicata. The ejaculatory duct opening is situated on a short projection between the broad, sometimes convoluted, lateral arms of the phallotremal sclerite, giving this sclerite a somewhat trident-like appearance from dorsal or ventral perspectives.

The female genitalia (Fig. 83) externally include a pair of long, dorsal setose lobes (do se) (area IXc of Nielsen, 1981), flexible basally in some species. A pair of semi-membranous, sensilla-bearing processes (s-b p) is usually present, each generally situated on the ventral edge of its respective setose lobe. Below these arise a pair of lamellae (lam) (IXd of Nielsen, 1981)

which often have longitudinal striae on their mesal face. The ventral gonopods form a flat plate (go pl), completely fused on the midline and fused laterally with segment IX for much of its length. The plate usually has transverse striae apically. Internally, the shape of the spermathecal sclerite (sp se) may be used to distinguish some groups of *Triplectides* species. Type species: *Mystacides gracilis* Burmeister (subsequent selection of Mosely, 1936).

Australis Group

The five Australian species included in this group are all viviparous, with the females bearing live first-instar larvae through ruptured ventral membranes between segment VIII and the gonopod plate. The pleural abdominal membranes are expanded in these species and the unruptured ventral membranes beyond segment VIII, when fully extended, may reach the second or third abdominal segment (Fig. 83c). A total of 661 larvae were found in one specimen of *T. australis* Navás although it is possible that some larvae had already escaped. Neboiss (1957) estimated 300-350 in another. We suspect that this reproductive strategy may be responsible, at least in part, for the remarkable success of these species in temporary waterways in the drier parts of the continent.

Diagnostic characters include the sharp posterior angle of the discoidal cell clearly separated from the thyridial cell by a short base of vein S_4 (Figs. 1-10), and the 2, 2, 2 tibial spur formula. In males, segment X lacks sharp dorsal or ventral carinae, distinguishing them from *T. ciuskus* and *T. similis* males, which they resemble in the above characters. Harpago usually with 2 or 3 apical teeth. Segment IX of males has a weakly sclerotized strip laterally, below which a broad lobe extends mesad to the phallus. Besides the expanded membranes discussed in the preceding paragraph, the females have greatly enlarged, sometimes sclerotized, sensilla-bearing processes below the conspicuous, dorsal setose lobes. The ventral lamellae are shorter, less conspicuous and much more weakly sclerotized than in other *Triplectides* species, and are often covered by the telescoped sternum VIII. The spermathecal sclerite is generally longitudinally rectangular.

***Triplectides australis* Navás**
(Figs. 1, 2, 54, 83)

Triplectides australis Navás, 1934, p. 93.

Triplectides australis, Neboiss, 1957, pp. 51-53, figs. 1-5; ♀ lectotype designated.

Triplectides australis, Neboiss, 1978, p. 836, fig. 28; ♂ first described.

Triplectides cephalotes, Mosely and Kimmins, 1953, pp. 204-206; misidentification for Australian specimens.

Triplectides cephalotes, Neboiss, 1982, p. 304, figs. 74, 75; misidentification for SW Australian specimens.

Pale to dark brown or grey. Male genitalia (Fig. 54) with distinctively tapered apex of phallus in ventral view. Harpago with subapical teeth. Mesal lobe of inferior appendage broadly rounded, with blunt lateral corner. Female sensilla-bearing lobe semi-membranous, slender, acute (Fig. 83).

This species may be the one described as *T. viviparus* (Wood-Mason, 1890) from India and the species misidentified by various authors as *T. magnus* (Walker, 1852) in Asia from India to New Guinea to Japan.

Length of anterior wing: ♂ 11-15 mm; ♀ 13-16 mm.

Type material: Type ♀, Sydney, NSW; Collection Luddemann, (IPE).

Other material examined: Numerous specimens from many Australian localities including records from lagoons in Central Australia and Northern Territory near the Gulf of Carpentaria; rivers in Western Australia including the Kimberley region; south-west Australian localities are listed in detail by Neboiss (1982) under the name of *T. cephalotes*. Large numbers of specimens were available from localities in Queensland, New South Wales and Victoria. Specimen PT-849 ♂ from Jindabyne, NSW and PT-864 ♀ from Molong, NSW figured (NMV).

Distribution: Australia except Tasmania.

Habitat: larger, slow flowing rivers and lentic water basins.

***Triplectides helvolus*, n. sp.**
(Figs. 3, 4, 55, 84)

Body and wings pale yellow. Male genitalia (Fig. 55) with segment IX as discussed for species group, long dorsally. Superior appendages nearly as long as tergum X. Tergum X rounded apically, incised on midline. Inferior

appendages with short apico-dorsal lobe 1.5X as long as harpago; baso-ventral lobe extending only $\frac{2}{3}$ distance to base of harpago; mesal lobe very narrow, finger-like; and harpago without subapical teeth. Phallus short, gradually curved ventrad, somewhat tapered apically in ventral view, but not as much as in *T. australis*.

Female genitalia (Fig. 84) with dorsal setose lobes long, broad, rounded apically in lateral view, at least 2X as long as sensilla-bearing lobes. Sensilla-bearing lobes sclerotized, truncate apically with row of short, stout setae. Lamellae semi-membranous. Spermathecal sclerite rectangular, broadly rounded posteriorly.

This species most closely resembles *T. australis*, but is distinguishable by its paler colour, and, in the male, by the less markedly tapered tip of its phallus, the lack of subapical teeth on the harpago, the shorter apico-dorsal and baso-ventral lobes of the inferior appendage, and the narrower mesal lobe of the inferior appendage. In the female, it is distinctive in the shorter, truncate, sclerotized sensilla-bearing processes.

Etymology: *helvolus*—(Latin) yellow, pale-yellow.

Length of anterior wing: ♂ 11-12.5 mm; ♀ 12-14.5 mm.

Type material: Holotype ♂ Lambells Lagoon, Humpty Doo, NT., 19 Aug. 1979, J. Blyth (NMV, T-7510); paratypes 11 ♂ 5 ♀, collected with holotype (specimen PT-866 ♀ figured) (ANIC; NMV); 1 ♂ 3 ♀, 5 km NNW Cahills Crossing, East Alligator River, 12°23' S 132°57' E, 8-9 June 1973, J. C. Cardale (specimen PT-842 ♂ figured) (ANIC; NMV); 1 ♂ 4 ♀, Howard Creek, 3 km E of Howard Springs, NT., 17 Aug. 1979, J. Blyth (NMV); 2 ♂ 14 ♀, McCaddy's Lagoon, Reynolds River, 80 km SW of Darwin, NT., 22 Aug. 1979, J. Blyth (NMV); 1 ♂ 1 ♀, Goose Lagoon, 15 km SW by S of Boorooloola, NT., 16°10' S 136°15' E, 31 Oct. 1975, J. C. Cardale (ANIC); 1 ♂, Drysdale River, 15°02' S 126°55' E, WA., 3-8 Aug. 1975, I.F.B. Common & M. S. Upton (ANIC).

Other material examined: **Northern Territory**—3 ♀, 16 km E by N of Mt. Cahill, 13 June 1973, J. C. Cardale (ANIC); 2 ♀,

Nourlangie Creek, 14-17 June 1973, J. C. Cardale (ANIC); 3 ♀, Cooper Creek, nr. Borradale, 3-6 June 1973, J. C. Cardale (ANIC); 1♂, Howard Springs, 9 Sept. 1980, D. King (NMV); 1♂, 48 km E of Darwin (no date), G. F. Hill (BPBM) (head missing); **North Queensland**—1♂, Tinaroo Pines Caravan Park, 9 Apr. 1972, N. McFarland (NMV); 1♀, Shipton Flat 15°45'S 145°14'E, 17-19 Oct. 1980 J. C. Cardale (ANIC); 1♀, Moses Creek, 4 km N by E of Mt. Finnigan, 14-16 Oct. 1980, J. C. Cardale (ANIC); 1♀, Peach Creek Crossing, 25 km NNE of Coen, 4-5 Jul. 1976, G. B. Monteith (ANIC); **North West Australia**—1♀, Carson escarpment, 14°49'S 126°49'E, 9-15 Aug. 1975, I.F.B. Common & M.S. Upton (ANIC).

Distribution: N-Qld.; NT.; NW-Australia.
Habitat: usually lakes and lagoons.

Triplectides magnus (Walker)
(Figs. 5, 6, 56, 85)

Leptocerus magnus Walker, 1852, p. 73.

Triplectides magna, MacLachlan, 1866, p. 257, pl. 19, figs. 3a-e.

Triplectides magna, Mosely, 1936, p. 100-103, figs. 2, 23-25.

Triplectides magna, Mosely and Kimmins, 1953, p. 200-204, figs. 134-136.

Triplectides magnus, Neboiss, 1977, p. 128, figs. 694-696.

Usually larger and darker than other Australian species of this group. Apex of male phallus parallel-sided (Fig. 56). Harpago short, with subapical teeth. Apico-dorsal and basoventral lobes of inferior appendage of variable length, but shorter than in *T. australis*. Mesal lobe of inferior appendage very broad, but with its blunt corner clearly situated beyond the rest of the lobe.

Female dorsal setose lobes (Fig. 85) relatively smaller than in the 2 preceding species. Sensilla-bearing processes short, sclerotized, triangular. Anterior edge of each lamellae thick, angled laterally (best seen in ventral view).

The species identified by various authors as *T. magnus* from Asia, New Zealand and other locations outside southeastern Australia is probably some other species, possibly *T. Australis*.

Length of anterior wing: ♂ 15-18 mm; ♀ 17-18 mm.

Type material: Type ♂, 'Van Dieman's Land. Dr. Hooker's Collection' (without other data) (BMNH).

Other material examined: **Tasmania**—Hobart, Lake Pedder, Olga River, Condominion Creek—dates between end of October and mid-February; **Victoria**—Creswick, Tabilk, Latrobe River, Lake Barracoota—dates between end of October and end of February. Specimen PT-314 ♂ and PT-825 ♀ from Lake Pedder, Tas. figured.

Distribution: Tas.; S-Vic.

Habitat: lakes and sluggish rivers, possibly also small creeks.

Triplectides parvus (Banks)
(Figs. 7, 8, 57, 86)

Notanotolica parva Banks, 1939, p. 485, pl. 1, fig. 4, pl. 7, fig. 62.

Pale grey to pale brown. Male genitalia (Fig. 57) with parallel-sided phallic tip. Harpago with subapical teeth. Superior appendages somewhat shorter and broader than in other species of this group. Apico-dorsal and basoventral lobes shorter than in *T. australis*. Distinctive mesal lobe of inferior appendage usually concave apically with rounded mesal projection extending beyond acute lateral corner (Figs. 57b, 57f), but few in Northern Territory with lobes (Fig. 57a) approaching those of *T. volda*.

Female genitalia (Fig. 86) with relatively small, dorsal setose lobes. Sensilla-bearing processes very broad, usually rectangular, sclerotized, without small mesal finger-like projections sometimes seen in *T. volda*. Pleural region of segment IX usually with well-defined secondary carina distad from primary one. Anterior edge of each lamella thick, angled laterally. Both sexes usually with fork no. 1 present in hindwing, but exceptions exist.

Length of anterior wing: ♂ ♀ 10-13 mm.

Type material: Type ♂, Ravenshoe, Atherton Tableland, N-Qld., 27 Apr. (1932) Darlington, Harvard Expedition. MCZ Type no. 22077 now in ANIC (specimen figured).

Other material examined: **North-Queensland**—Iron Range, Upper Jardine River, McIvor River, Cooktown, Mt Webb (specimen PT-832 ♀ figured), Cairns, Atherton

Tableland, Gordonvale, Mareeba—dates throughout the year except February, March and April; **Northern Territory**—Holmes Jungle and Howard Springs near Darwin (March and June); **SE-Queensland**—Kenilworth (specimen PT-823 ♂ figured), Manchester Dam (February and April).

Distribution: NT (Darwin area); N-Qld.; SE-Qld.

Habitat: associated with moderately fast flowing creeks.

Triplectides volda Mosely
(Figs. 9, 10, 58, 87)

Triplectides volda Mosely, in Mosely and Kimmins, 1953, pp. 210-212, figs. 142, 143.

Pale grey to pale brown. Male genitalia (Fig. 58) very similar to those of *T. parvus* except that mesal lobe of inferior appendage is evenly convex to acute lateral corner.

Female genitalia (Fig. 87) similar to those of *T. parvus*, except sensilla-bearing processes usually more triangular, often with small mesal finger-like projection; secondary carina in pleural region of segment IX less pronounced. Spermathecal sclerite occasionally with posterior portion recurved ventrad. Both sexes usually with fork no. 1 in hindwing absent or S_1 represented only by short, vestigial stub, but exceptions exist.

Length of anterior wing: ♂ ♀ 10-12 mm.

Type material: Type ♂, Eidsvold, Qld., October, 1926, I. M. Mackerras (ANIC).

Other material examined: **Queensland**—2 ♂ 1 ♀, Upper Jardine River, 11°17'S 142°35'E, 17 Oct. 1979, M.S. & B.J. Moulds (NMV); 4 ♀, Iron Range, 2-9 June 1971, E. F. Riek (ANIC); 1 ♂, Annan River, 15°41'S 145°12'E, 27 Sept. 1980, J. C. Cardale (ANIC); 1 ♂ 2 ♀, Millstream Falls, W of Ravenshoe, 25 June 1971, E. F. Riek (ANIC); 1 ♂, Christmas Creek, Fairview via Laura, 26-27 June 1975, S. R. Monteith (ANIC); 1 ♂ 3 ♀, Granite Creek, Many Peaks, 1 Apr. 1972, S. R. Monteith (ANIC); 5 ♂ 1 ♀, Kenilworth, 7 Apr. 1967, N. Dobrotworsky (NMV); 2 ♂ 4 ♀, Upper Brookfield nr. Brisbane, 4 Apr. 1967, N. Dobrotworsky (NMV); 15 ♂ 9 ♀, Camp Mountain, 31 Mar. 1967, N. Dobrotworsky (specimen PT-850 ♂ and PT-867 ♀ figured)

NMV); 1 ♀, Manchester Dam, Ipswich, 1 Feb. 1973, M. H. Colbo (NMV); **New South Wales**—♂ ♀ (numerous), Upper Allyn River, Eccleston, 21 Feb. 1980, A. A. Calder (NMV); 2 ♂ 1 ♀, Serpentine River, 21 Feb. 1966, E. F. Riek (ANIC); 1 ♂, Orrarol River 40 km S of Canberra, 10 Apr. 1981, A. Neboiss (NMV); 1 ♂, Stroud, 13 Nov. 1953, A. Neboiss (NMV); 1 ♂, Neimer River, Wakool. 26 Dec. 1954, E. Matheson (NMV); 14 ♂, Upper Kangaroo Valley, 24 Nov. 1960, E. F. Riek (ANIC); **Victoria**—1 ♀, Irymple, 25 Nov. 1964, A. Neboiss (NMV); 1 ♂, Mitta Lagoon, 30 Nov. 1973, NMV Survey (NMV); 1 ♂, Gibbo River—Morass Creek Junctn., 1 Feb. 1974, A. Neboiss (NMV); 1 ♂, Rose River Whitfield, 11 Feb. 1963, A. Neboiss (NMV); 5 ♂ 6 ♀, Meredith, 12 Feb. 1959, A. Neboiss (NMV).

Distribution: Qld.; NSW; Vic.

Habitat: fast and slow streams, lagoons.

Proximus Group

Wing venation (Figs. 11-14) is similar to that in the Australis Group. The tibial spur formula is 2, 2, 4. Male genitalia are distinguishable by the narrow, parallel-sided superior appendages about as long as acute tergum X (see also Neboiss, 1977, fig. 704). The ventral edge of the harpago is serrate. The tip of the phallus is somewhat enlarged and the apical lips are recurved laterally. The mesal lobe of each inferior appendage has 2 distinct projections. Female genitalia exhibit a pair of short, spatulate dorsal setose lobes, flexible basally. No sensilla-bearing projections are evident. Lamellae are small, but well sclerotized and without conspicuous setae or striae. Antero-ventrad from each lamella is a distinct, semi-membranous projection. The fused gonopods are with (*T. bilobus*) or without (*T. proximus*) transverse striae. The spermathecal sclerite has an ovoid ring which traverses it obliquely, crossing above the anterior end of the sclerite, near its tip, and nearly, but not quite, closing near the postero-ventral end.

Triplectides bilobus Neboiss
(Figs. 11, 12, 59, 88)

Triplectides bilobus Neboiss, 1977, p. 130, figs. 703-706.

Dark brown. Male genitalia (Fig. 59) dis-

tinguishable from those of *T. proximus* by smaller, less-flared apex of phallus; shorter, out-turned baso-ventral lobe of inferior appendage; and much smaller, acute mesal process of mesal lobe of inferior appendage.

Female genitalia (Fig. 88) with lamella narrow in lateral view, 2X as long as broad. Gonopod plate with transverse striae. Oblique ring of spermathecal sclerite crossing above anterior end of sclerite further from tip than in *T. proximus*.

Length of anterior wing: ♂ ♀ 15-18 mm.

Type material: Holotype ♂, Franklin River 20 km SW of Derwent Bridge, Tas., 11 Feb. 1971, A. Neboiss (NMV, T-5406), paratypes collected with holotype, specimens PT-309 ♂ and PT-860 ♀ figured.

Other material examined: **Tasmania**—(localities additional to those listed by Neboiss 1977); 2 ♂, Ropeway Creek—Gordon River junction, 2 Feb. 1977, D. Coleman (NMV); 2 ♂ Denison-Maxwell River junction, 10 Jan. 1977, A. Neboiss and R. Swain (NMV); 1 ♂ 2 ♀, Sir John Falls, Cataract Creek, 12 Dec. 1975, D. Coleman and W. Fulton (NMV); ♂ ♀ (numerous), Olga River 19 km above Gordon River junction, 13 Jan. 1977, D. Coleman, A. Neboiss, et al. (NMV).

Distribution: NW and SW Tas.

Habitat: rivers and larger creeks.

***Triplectides proximus* Neboiss** (Figs. 13, 14, 60, 89)

Triplectides proximus Neboiss, 1977, p. 130-131, figs. 707-708.

Blackish-brown. Male genitalia (Fig. 60) with phallus enlarged and conspicuously flared apically. Straight, parallel-sided baso-ventral lobe of inferior appendage extends to base of harpago. Mesal lobe of inferior appendage with rounded mesal projection broader than lateral projection.

Female genitalia (Fig. 89) with lamella triangular in lateral view, as broad basally as long. Gonopod plate without conspicuous transverse striae. Oblique ring of spermathecal sclerite traversing dorsal side of sclerite very near anterior end.

Length of anterior wing: ♂ 13-16 mm; ♀ 14-16 mm.

Type material: Holotype ♂, Leven River nr. Heka, Tas., 17 Nov. 1972, A. Neboiss (NMV, T-5417); paratype ♂ collected with holotype, specimen PT-218 and paratype ♀, St Patricks River, Targa, PT-859 figured (NMV).

Other material examined: **New South Wales**—15 ♂ 2 ♀, Brown Mtn., 18 Jan. 1961, E. F. Riek (ANIC; NMV); 1 ♂ Sawpit Creek, Mt Kosciusko, 13 Feb. 1975, T. Petr (NMV); **Victoria**—numerous localities in Central, Eastern and North-eastern highlands, North-central Gippsland, East-Gippsland, dates ranging between October and March.

Distribution: N-Tas.; E-Vic; SE-NSW.

Habitat: medium sized rapid streams.

Australicus Group

Wing venation (Figs. 15-20) is similar to that in the Australis Group. The tibial spur formula is 2, 2, 2 (*T. ciuskus*) or 2, 2, 4 (*T. australicus*). Male genitalia are distinctive for their pair of thin, longitudinal plates on the ventral side of segment X, beneath its broadened and occasionally incised apex. The superior appendages are nearly as long as tergum X, but are broader basally than in the Similis, Elongatus, and Truncatus Groups. The harpago is long and with subapical teeth. The apico-dorsal lobe of the inferior appendage is scarcely longer than the harpago. The baso-ventral lobe extends to the base of the harpago. The mesal lobe of the inferior appendage is nearly truncate, either slightly convex (*T. australicus*) or slightly concave (*T. ciuskus*), with an acute lateral corner; its dorsal face has 1 or 2 longitudinal carinae. The phallus is angled near the base. Female genitalia are typical for the genus except that the lamellae lack conspicuous setae and the spermathecal sclerite is rectangular.

***Triplectides australicus* Banks** (Figs. 15, 16, 61, 90)

Triplectides australica Banks, 1939, p. 486, figs. 47, 66.

Moderate to pale yellow. Spurs generally 2, 2, 4, but rarely 2, 2, 2 on one side, 2, 2, 4 on other! Male genitalia (Fig. 61) distinguishable from those of *T. ciuskus* by sinuate edge of ventral, longitudinal plates of segment X and by convex apex and blunt lateral corner of mesal lobe of inferior appendage. Sinuate edge of

ventral plates of tergum X varying from that seen in Fig. 61a nearly to that of Fig. 62a.

Setose dorsal lobe of female genitalia (Fig. 90) narrow, its dorsal edge straight in lateral view. Striae of lamellae and gonopod plate less conspicuous than in *T. ciuskus*.

Length of anterior wing: ♂ 11.5-13 mm; ♀ 12.5-14 mm.

Type material: Type ♂, Ravenshoe, Atherton Tableland, 27 Apr. (1932) Darlington, Harvard Expedition. MCZ type no. 22080 now in ANIC (specimen figured).

Other material examined: **Queensland**—1 ♂ 1 ♀, Cairns, May 1963. K. Korboot (NMV) (specimens PT-855 ♂ and PT-862 ♀ figured); 1 ♀ Broken River Camp. Eungella National Park, 9 May 1980, I. D. Naumann and J. C. Cardale (ANIC); 1 ♂ 36 km S of Miriam Vale, 25 May 1971, E. F. Riek (ANIC); 1 ♂ 8 ♀, Saddle Creek via Maidenwell, 29 Mar. 1975, S. R. Monteith (ANIC); 5 ♂, same loc., 16 Oct. 1973, A. Neboiss (NMV); 3 ♂, Clintonvale, 14 Oct. 1973, A. Neboiss (NMV); 3 ♂ 2 ♀, Myall Creek 3 km N of Rangemore, 15 Oct. 1973, A. Neboiss (NMV); 4 ♂, Bulimba Creek, Brisbane, 23 Oct. 1979, Survey Group (NMV); 2 ♂, Goomburra, 14 Oct. 1973, A. Neboiss (NMV); 1 ♂ 8 ♀, Upper Brookfield, 4 Apr. 1967, N. Dobrotworsky (NMV); 8 ♂, Brisbane, 15 Aug. 1957 (no collector) (NMV); **New South Wales**—2 ♂ 3 ♀, Wallangarra, 31 Dec. 1956, J. Kerr (NMV); 3 ♀, Molong, 29 Dec. 1973, M. S. Moulds (NMV); 1 ♂, Limestone Creek, Lyndhurst, 21 Dec. 1977, A. Neboiss (NMV); 3 ♂, Kangaroo Valley, 22 Mar. 1961, E. F. Riek (ANIC); **Victoria**—3 ♂ 1 ♀, Hopkins River, 19 Jan. 1953, A. Neboiss (NMV); 1 ♂, same loc., 28 Oct. 1955, A. Neboiss (NMV); 1 ♂, Avenel, 9 Dec. 1954, A. Neboiss (NMV); 1 ♂, Campaspie River, Woodend, 19 Jan. 1956, A. Neboiss (NMV); 3 ♂, Sunbury, 18 Dec. 1953, A. Neboiss (NMV); 15 ♂ 1 ♀, Reedy Creek, Orbost, 6 Feb. 1961, N. Dobrotworsky (NMV); **Western Australia**—1 ♂, Deep Reach, Fortescue River, 3 Dec. 1974, K. F. Walker (NMV); 2 ♀, Crossing Pool, Millstream, 21 Oct. 1970, J. C. Cardale (ANIC); 1 ♂ 20 ♀, same loc., 2 Apr. 1971, E. F. Riek (ANIC).

Distribution: Qld.; NSW; Vic; N-WA.

Habitat: larger, slow flowing rivers; slow flowing sections of creeks.

Triplectides ciuskus Mosely (Figs. 17, 18, 62, 91)

Triplectides ciuska Mosely in Mosely and Kimmins 1953, pp. 209-210, fig. 141.

Triplectides ciuskus, Neboiss, 1977, pp. 127-128, figs. 690-693.

Triplectides ciuskus, Neboiss, 1978, p. 836, fig. 27.

Light to dark brown. Spurs 2, 2, 2. Edge of ventral, longitudinal plates of segment X varying from blunt or acute angle (Fig. 62a) to projecting point (Mosely & Kimmins 1953, Fig. 140b) in lateral view. Mesal lobe of inferior appendage usually slightly concave apically, with acute lateral corner.

Setose dorsal lobe of female genitalia broad, its dorsal edge evenly convex in lateral view. Striae of lamellae and gonopod plate conspicuous.

Length of anterior wing: ♂ 12-14.5 mm; ♀ 12.5-15 mm.

Type material: Type ♂, Mt. Kosciusko, 3000 ft., NSW, 20 Jan. 1914 (ANIC).

Other material examined: extensive number of specimens were examined from numerous localities in the Eastern States, and Northern Territory; Tasmanian localities are listed in detail by Neboiss (1977). The species is known from Western Australia by a subspecies in the Kimberley area; it is absent from Central Australia. Specimen PT-856 ♂, Dartmouth, Vic. and PT-863 ♀, Orroral River, ACT., figured (NMV).

Distribution: N.T.; Qld.; NSW; Vic; Tas.

Habitat: usually associated with sluggishly flowing sections of moderately large permanent streams.

Triplectides ciuskus seductus, n. subsp. (Figs. 19, 20, 63)

Body and wings light to dark brown. Spurs 2, 2, 2. Male genitalia (Fig. 63) as for nominal subspecies except edge of ventral, longitudinal plates of segment X evenly convex in lateral view. Apex of segment X sometimes deeply incised. Female genitalia indistinguishable from those of nominal subspecies.

Despite the clear distinction in at least one character, we are reluctant to assign full species

status to this form in light of the small number of specimens seen and in light of the variability in that character throughout the broad range of the nominal subspecies.

Etymology: *seductus*—(Latin) remote.

Length of anterior wing: ♂ 10.5-11.5 mm; ♀ 11-12.5 mm.

Type material: Holotype ♂, Camp Creek, Mitchell Plateau, NWA., 13 Jul. 1978, P. Suter (NMV, T-7541); paratypes 1 ♂, same loc., 14 Feb. 1979, J. E. Bishop (specimen PT-857 ♂ figured) (NMV); 1 ♂ 1 ♀, Camp Creek at Crusher site, Mitchell Plateau, NWA., 21 Jul. 1978, P. Suter (NMV); 3 ♂ 1 ♀, Carson escarpment, 14°49'S 126°49'E, NWA., 9-15 Aug. 1975, I. F. B. Common and M. S. Upton (ANIC); 2 ♂ 1 ♀, Morgan Falls, 15°02'S 126°40'E, NWA., 16-17 Aug. 1975, I. F. B. Common and M. S. Upton (ANIC); 1 ♂ 2 ♀, Drysdale River, 14°39'S 126°57'E, NWA., 19-21 Aug. 1975, I. F. B. Common and M. S. Upton (ANIC).

Other material examined: **Northern Territory**—1 ♀, King River, 17 Aug. 1960 (no collector) (NMV); 2 ♂, Butterfly Gorge, 27 Jan. 1977, M. S. Moulds (NMV).

Distribution: NW Australia (Kimberley area); NT.

Habitat: small, shallow creeks.

Enthesis Group

The single distinctive species in this group shows some relationship to members of the Australicus Group, as evidenced by a pair of ventral, longitudinal plates on segment X, a harpago with subapical teeth, and an angled phallus. The female resembles species in the Truncatus Group with its somewhat rectangular gonopod plate and short dorsal setose lobes. On the other hand, the unmodified form of segment IX is unlike that of any of the preceding groups and the nearly-straight closing crossvein of the forewing discoidal cell (Fig. 24) is unique in *Triplectides*.

Triplectides entthesis Neboiss

(Figs. 24, 64, 92)

Triplectides entthesis Neboiss, 1982, p. 305, figs. 82-84.

Dark brown body; wings dark brown with small, scattered lighter irrorations, especially basally. Spurs 2, 2, 4.

Superior appendages of male genitalia slender, $\frac{2}{3}$ as long as tergum X. Sclerotic lobes of segment X nearly completely separate, joined by membranes almost to deep apical incision dorsally and to sclerotic bridge above anal opening on underside of segment. Basal portion and baso-ventral lobe of each inferior appendage nearly as long as segment X. Mesal lobes of inferior appendages subtruncate with blunt angles.

Female genitalia (Fig. 92) with dorsal setose lobes short, triangular, each with tiny sensilla-bearing process on inside ventral margin. Lamellae with short setae, nearly rectangular in lateral view. Striae of lamellae and gonopod plate inconspicuous. Spermathecal sclerite rounded anteriorly. Vertical crescentic carina on upper lateral surface of segment IX relatively closer to anterior edge of segment than in other known *Triplectides* species.

Length of anterior wing: ♂ 13.5 mm; ♀ 13-14 mm.

Type material: Holotype ♂, Beedelup Falls, W.A., 13 Nov. 1971, E. F. Riek (ANIC) (holotype figured); paratypes 4 ♀, collected with holotype (ANIC; NMV), specimen PT-878 ♀ figured.

Distribution: SW-Australia.

Habitat: rapidly flowing section of a creek.

Similis Group

In the long, slender superior appendages and apico-dorsal lobes of the male genitalia and the short, oblique dorsal setose lobes and triangular spermathecal sclerite of the female genitalia, the single species in this group resembles those of the Truncatus and Elongatus Groups. However, the 2, 2, 2 spur formula, the angled posterior apex of the male forewing discoidal cell (Fig. 22), and the short, simple mesal lobe of the male inferior appendages make the group distinctive.

Triplectides similis Mosely

(Figs. 21, 22, 65, 66, 93)

Triplectides similis Mosely in Mosely and Kimmins, 1953, p. 210, fig. 141.

Triplectides similis, Neboiss, 1977, p. 129, figs. 697, 698.

Dark brown body with hoary appearance given by whitish setae. Forewings distinctively marked with light and dark brown hairs. Apical

forks of $S_4 + M$ veins in male hindwing unusual for *Triplectides* with MA (or M_2) continuing in straight line from base of M , S_4 (or $S_4 + M_1$) and MP diverging from it at acute angles. Spurs 2, 2, 2. Eye size of males variable; ratio of greatest eye width in dorsal view to narrowest distance between them either 0.50-0.62 or 1.2-1.6. Small-eyed forms generally have shorter forewings. Female eyes normal small size as other *Triplectides* species. Male genitalia (Figs. 65, 66) somewhat variable, yet variations not restricted to particular eye forms. Tergum X tapered or rounded in lateral view with pair of dorsal, longitudinal ridges. Harpago without subapical teeth. Baso-ventral lobe of inferior appendages short or long, extending no more than mesal lobes or to beyond base of harpago. Mesal lobe rounded apically, with variable breadth.

Females (Fig. 93) with short, oblique dorsal setose lobes. Broad lamellae and gonopod plate with conspicuous striations. Distinct carina extending anteriorly from ventral edge of each lamella.

Although the range of this species extends over most of eastern Australia, we have seen no large-eyed forms from Queensland nor small-eyed forms from Tasmania. In Victoria and New South Wales the two forms are often captured in the same light-trap collection. Females from throughout the range of the species are indistinguishable. These data suggest that the distinctive eye forms represent variation at a single, sex-linked gene locus. Breeding experiments and rearing from single egg masses will be needed to corroborate this interesting observation.

Length of anterior wing: ♂ ♀ 14-18 mm.

Type material: Type ♂, Deloraine, Tas., 27 Dec. 1884, MacLachlan Collection (BMNH).

Other material examined: **Queensland**—Carnarvon Range, Conondale Range, Mt Mee; **New South Wales**—Dorrigo, Upper Allyn River, Gloucester River, Singleton, Canberra, Colo, Rosebank, Brown Mtn., Khancoban (dates range through from November to Mid-April); **Victoria**—numerous localities mainly in southern districts, dates ranging from late-October to mid-April (specimen PT-818 ♂, Cowwarr weir, Vic., figured); **Tasmania**—

various localities between late-November till early February (specimen PT-868 ♀, Evandale, Tas., figured); **South Australia**—National Park, Dec.

Distribution: SE-Qld.; E-NSW; Vic.; Tas.; SA.

Habitat: medium size streams with slowly flowing pools.

Niveipennis Group

Although the single species of this group has a sharply angled posterior apex in the forewing discoidal cell and a harpago with subapical teeth like most of the preceding species and a superanal sclerotic bridge and long basal segment of inferior appendage like *T. entthesis*, several peculiar features of the male set this species apart from other known groups. The short, broad superior appendages, the divergent apical lobes of tergum X (Mosely and Kimmins, 1953, fig. 145), the short baso-ventral lobe of the inferior appendages, the very long mesal lobe of the inferior appendages, and especially the unusually broad hindwings, each with 2 additional veins in the anal field (Fig. 23) all complicate attempts for more refined taxonomic placement. Surely the discovery of the female for this species will shed light on its historical relationships.

Triplectides niveipennis Mosely (Figs. 23, 67)

Triplectides niveipennis Mosely in Mosely and Kimmins, 1953, p. 217, fig. 145.

Triplectides niveipennis, Neboiss, 1982, p. 305, figs. 79-81.

Body and forewings light brown with white and light brown hairs interspersed. Hindwings white. Spurs 2, 2, 4. Compound eyes black and thus quite conspicuous, but, contrary to Mosely's (1953) remark, not unusually large (ratio of greatest eye width from above to narrowest distance between them = 0.65). Male genitalia as in Fig. 67. Female unknown.

Length of anterior wing: ♂ 12-14 mm.

Type material: Type ♂, Yanchep, N of Perth, WA., 13-23 Nov. 1935, R. E. Turner (BMNH), paratype ♂ collected with holotype, PT-714 figured (NMV).

Other material examined: **Western Australia**—Yanchep, Margaret River (November) (ANIC, NMV).

Distribution: SW-Australia.

Habitat: lakes and slowly flowing pools in creeks.

Elongatus Group

In this and the following group, the posterior apex of the discoidal cell in the male forewing projects toward the median vein in an evenly curved line. In this group the discoidal cell is connected with the median vein by a short base of vein S_4 , obscured or absent in the *Truncatus* Group. The apex of the male forewing thyridial cell in both species groups narrowed, especially in the *Truncatus* Group, the basal end of the narrowed portion marked by an accessory m-cu crossvein beyond the fork of cubitus vein (fork no. 5). Spurs are 2, 2, 4 in both groups. In males of both groups, the apical membranes and phallosclerite are more nearly enclosed by the sclerotized apex of the phallobase; the synsclerotized segment IX is narrow, broadest dorsally; and a row of 1 or more straight setae arise about mid-length on each ventral edge of segment X. The spermathecal sclerite in females of both groups is more nearly triangular than in the preceding species except *T. similis*. The gonopod plate of the 2 species in this group whose females are known is nearly triangular, with lateral ridges (and the pockets above them) converging toward the posterior apex.

Triplectides prolatus, n. sp.

(Figs. 25, 26, 68)

Body and wings light yellowish brown. Male forewing (Figs. 25, 26) with rounded posterior apex of discoidal cell as in other *Elongatus* Group species, clearly connected with M vein by basal section of S_4 as long as m-cu crossvein. Position of crossvein variable, sometimes more distal than shown.

Male genitalia (Fig. 68) with long, slender superior appendages. Tergum X long, narrow in lateral view, with divergent, acute apices in dorsal view. Inferior appendages long basally; apico-dorsal lobe 1.5X as long as harpago; baso-ventral lobe very long, extending to apex of tergum X; mesal lobe divided into long blunt mesal projection and acute, triangular lateral projection. Harpago with obtuse angle at mid-length on dorsal and ventral edges. Phallus

abruptly curved basally, then nearly straight to rounded apex, deeply incised in ventral view.

This species is probably most closely related to the following two species but can be distinguished from them readily by the much longer baso-ventral lobe and shorter mesal lobe of the inferior appendage, the simpler harpago, and the lack of sharp carinae on the dorsum of tergum X. Female unknown.

Etymology: *prolatus*—(Latin) extended, elongated.

Length of anterior wing: ♂ 10-11 mm.

Type material: Holotype ♂, Davies Creek Road, Marceba, N-Qld., 21 Feb. 1976, A. Walford-Huggins (NMV, T-7501); paratypes 1 ♂, Crystal Cascades nr. Cairns, 10 June 1971, E. F. Riek (specimen PT-841 ♂ figured) (NMV); 1 ♂, Julatten, N-Qld., 21 Dec. 1975, A. Walford-Huggins (NMV); 1 ♂, Tinaroo Dam, Kairi Creek, N-Qld., 22 June 1971, E. F. Riek (ANIC); 1 ♂, Kuranda, N-Qld., 23 Jan. 1975, N. Quick (NMV); 1 ♂, Kirrama Range via Kennedy, N-Qld., 12 May 1975, Storey and Hancock (QM); 1 ♂, Moses Creek, 4 km N by E of Mt Finnigan, N-Qld., 14-16 Oct. 1980, J. C. Cardale (ANIC); 1 ♂, 14 km W by N Hope Vale Mission, 15°16'S 144°59'E, N-Qld., 8-10 Oct. 1980, J. C. Cardale (ANIC); 2 ♂, Bellenden Ker Range, Cableway Base Stn. 100 m, 17-31 Oct. 1981, Earthwatch survey (QM).

Distribution: N-Qld.

Habitat: small, fast flowing creeks.

Triplectides liratus, n. sp.

(Figs. 27, 28, 69, 94)

Wings and venter of body pale yellowish brown; dorsum of body medium brown; distinctive brown triangular mark at stigma of forewing with darker brown marginal streak beyond it. Male forewing venation (Figs. 27, 28) very similar to that of *T. prolatus* except base of S_4 vein and m-cu crossvein slightly shorter.

Male genitalia (Fig. 69) with slender superior appendages slightly more than half as long as segment X. Segment X long, narrow, acute in lateral view, with pair of prominent, longitudinal dorsal ridges. Basal segment of inferior appendages shorter than in following species, 1.5X as long as harpago; apico-dorsal lobe and

baso-ventral lobe longer, with apico-dorsal lobe 2X as long as harpago and baso-ventral lobe extending beyond base of harpago. Shape of harpago distinctive with 2 small teeth apically and 2 or 3 additional small teeth on short, broadened portion of ventral flange set off by more narrow portion about mid-length. Mesal lobe of each inferior appendage very long triangle with blunt apex extending past base of harpago to tip of baso-ventral lobe; tiny acute projection basally. Lateral view of phallus similar to that of *T. prolatus*; in ventral view apex not as deeply incised, apices of lateral arms of phallotremal sclerite apparently fused with apex of phallobase.

Female genitalia (Fig. 94) with long, slender dorsal setose lobes apparently lacking sensilla-bearing processes. Lamellae nearly rectangular in lateral view.

This species is most closely related to the following one, but the male is easily diagnosed by the more pronounced dorsal lobes of tergum X, the longer apico-dorsal and baso-ventral lobes of the inferior appendages, and especially by the different shapes of the harpago and mesal lobe of each inferior appendage.

Etymology: *liratus*—(Latin) plowed ridge or furrow.

Length of anterior wing: ♂ ♀ 9-10 mm.

Type material: Holotype ♂, Windsor Tableland, NW of Mossman, N-Qld., 27 Dec. 1976, M. S. and B. J. Moulds (NMV, T-7497); paratypes 2 ♀, collected with holotype (specimen PT-874 ♀ figured) (NMV); 3 ♂ 1 ♀, Moses Creek, 4 km N by E of Mt Finnigan, N-Qld., 14-16 Oct. 1980, J. C. Cardale (specimen PT-837 ♂ figured) (ANIC; NMV); 1 ♂, Lock-Davies Creek Road, Lamb Range Mareeba district, N-Qld., 10 Nov. 1974, M. S. Moulds (NMV); 1 ♂, Kuranda N-Qld., 13 Mar. 1956, J. L. Gressitt (BPBM); 1 ♂, Upper Mulgrave River via Gordonvale, N-Qld., 29-30 Apr. 1970, S. R. Curtis (ANIC); 4 ♂, Bellenden Ker Range, Cableway Base Stn. 100 m, 17-24 Oct. 1981, Earthwatch Survey (NMV; QM).

Other material examined: **North Queensland**—1 ♀, 3 km NE of Mt Webb, 2 Oct. 1980, D. H. Colless (ANIC); 1 ♀, Lacey's Creek, Mission Beach, 14 May 1980, I. D. Naumann and

J. C. Cardale (ANIC); 1 ♀, Kairi Creek, Tinaroo Dam, Atherton Tableland, 24 Apr. 1970, S. R. Curtis (ANIC).

Distribution: N-Qld.

Habitat: small to medium size fast flowing creeks.

***Triplectides liratellus*, n. sp.**

(Figs. 29, 30, 70)

Colour of body and wings as in *T. liratus* except 2 additional darker brown triangular markings equally spaced near anterior edge of forewing basad of stigmal triangle. Male forewing venation (Figs. 29, 30) very similar to that of *T. liratus* except that basal section of S₄ vein and m-cu crossvein even shorter; accessory m-cu crossvein weak posteriorly.

Male genitalia (Fig. 70) similar to those of *T. liratus* except dorsal ridges of tergum X not as pronounced, basal segment of inferior appendages 1.8X as long as harpago, apico-dorsal lobe of inferior appendage only 1.6X as long as harpago, baso-ventral lobe of inferior appendage more slender and not extending to base of harpago. Harpago with 2 prominent apical teeth; subapical region narrow, strongly curved mesad; basal $\frac{2}{3}$ of ventral flange uniformly broad. Mesal lobe of each inferior appendage similar to that of *T. liratus* except baso-lateral projection broad, half as long as mesal projection. Phallus essentially as for *T. liratus*. Female unknown.

Etymology: *liratellus*—(Latin) little plowed ridge or furrow.

Length of anterior wing: ♂ 9-9.5 mm.

Type material: Holotype ♂, Shiptons Flat, 15°47'S 145°14'E, N-Qld., 17-19 Oct. 1980, J. C. Cardale (ANIC); paratype 1 ♂, The Boulders, W of Babinda, N-Qld., 29 June 1971, E. F. Riek (specimen PT-839 ♂ figured) (NMV).

Distribution: N-Qld.

Habitat: moderately fast flowing shallow creeks with deep pools.

***Triplectides varius* Kimmins**

(Figs. 31, 32, 71)

Triplectides varius Kimmins, 1953, in Mosely and Kimmins, 1953, pp. 221-223, figs. 145, 149.

Body and forewings dark brown with white and brown hairs. Hindwings paler. Male fore-

wing venation (Figs. 31, 32) with apex of thyridial cell very narrow, accessory m-cu crossvein shorter than more distal m-cu crossvein. Base of S_4 vein between discoidal cell and thyridial cell weak.

Male genitalia with slender superior appendages half as long as segment X. Segment X long, narrow, sinuate in lateral view, with out-turned ventral flanges and tiny midline excision apically (Mosely and Kimmins, 1953, fig. 149). Basal portion of inferior appendage 1.5X as long as harpago; apico-dorsal lobe 2.25-3.0X as long as harpago; baso-ventral lobe extending nearly to, or beyond, apex of harpago (Fig. 71). Harpago without accessory teeth, nearly straight to curved tip, narrow in ventral view. Mesal lobe of inferior appendage truncate with blunt mesal and lateral corners; lateral corner darker with minute reticulation. Phallus short, broadened and rounded apically in ventral view. Female unknown.

Length of anterior wing: σ 15-16 mm.

Type material: Type σ , Mt Kosciusko, 5000 ft., NSW, 6 Dec. 1921 (BMNH).

Other material examined: **New South Wales**—4 σ , Mt Kosciusko, 5500 ft., 17 Feb. 1968, M. S. Upton (specimen PT-846 σ figured) (ANIC; NMV); **Victoria**—1 σ , Upper Macalister River above Howitt Plains, 25 Feb. 1979, A. A. Calder (NMV).

Distribution: SE-NSW; Vic.

Habitat: mountain creeks.

***Triplectides dolabratus*, n. sp.**
(Figs. 33, 34, 72)

Colour uniformly light to moderate brown. Male forewing venation (Figs. 33, 34) as in *T. varius* except veins of thyridial cell fused for short distance at usual position of accessory m-cu crossvein. Base of S_4 vein and m-cu crossvein distinct but very short.

Male genitalia (Fig. 72) with slender superior appendages half as long as segment X. Segment X long, narrow, apically rounded in lateral view, apex slightly concave, but not incised, in dorsal view. Inferior appendages similar to those of *T. varius* except baso-ventral lobe extends only to mid-length of harpago; mesal lobe with prominent, acute mesal projection, convex reticulate apical region, and blunt or acute

lateral corner. Phallus very long, rounded apically in lateral view, with slightly broadened apex. Female unknown.

This species appears most closely related to *T. varius* but can be distinguished by the different shape of the mesal lobe of the inferior appendage.

Etymology: *dolabratus*—(Latin) shaped like an axe.

Length of anterior wing: σ 11.5-13 mm.

Type material: Holotype σ , Kirrama State Forest, 24 km WNW of Kennedy, N-Qld., 28 Jan. 1981, M. S. and B. J. Moulds (NMV, T-7505); paratypes 1 σ , 1 km N of Tully Falls, N-Qld., 8 Jan. 1976, A. Walford-Huggins (specimen PT-843 figured) (NMV); 1 σ , 25 km along Mt Lewis Road SW of Mossman, N-Qld., 16 Jan. 1977, M. S. and B. J. Moulds (NMV); 2 σ , Bellenden Ker Range, Cableway Base Stn, 100 m, 17-31 Oct. 1981, Earthwatch survey (QM); 2 σ , Mt Bartle Frere, ½ km N of South Peak, 1500 m, 6-8 Nov. 1981, Earthwatch survey (QM).

Distribution: N-Qld.

Habitat: small, fast flowing creeks.

***Triplectides elongatus* Banks**
(Figs. 35, 36, 73, 95)

Triplectides elongatus Banks, 1939, p. 486, pl. 4, fig. 39.
Triplectides dubius Mosely, in Mosely and Kimmins, 1953, p. 219, fig. 147.
Triplectides dubius var. *subalbidus* Kimmins, in Mosely and Kimmins, 1953, p. 219 (new synonym).
Triplectides elongatus, Neboiss, 1977, pp. 131-132, figs. 709-711.

Colour uniformly dark brown except sides of abdomen pale. Male forewing venation (Figs. 35, 36) without accessory m-cu crossvein and virtually without basal section of S_4 vein; discoidal cell and thyridial cell gradually convergent, nearly touching.

Although Neboiss (1977) synonymized *T. dubius* Mosely with *T. elongatus*, the subspecies *T. dubius subalbidus* Kimmins technically was still recognized. As it occurs within the range of *T. elongatus*, its genitalia and vestiture does not deviate noticeably from the typical form, it is here reduced to a synonym.

Male genitalia with superior appendages slender and half as long as segment X which is

rounded and deeply, but narrowly, incised apically in dorsal or ventral view (Mosely and Kimmins, 1953, Fig. 147; Neboiss, 1977, Fig. 711). Inferior appendages similar to those of *T. varius* except apico-dorsal lobe more than 3X as long as harpago (Fig. 73). Mesal lobe triangular, without lateral corner, or tiny lateral corner evident in some specimens. Phallus of moderate length, slightly broadened subapically in ventral view.

Female genitalia (Fig. 95) with short, rounded, dorsal setose lobe about as long as sensilla-bearing process or only slightly longer. Lamella in lateral view obliquely truncate or concave. Transverse striations of gonopod plate confined to small apical region.

Length of anterior wing: ♂ 12-15 mm; ♀ 14-16 mm.

Type material: Type ♂, Blackheath, Blue Mts. 3000 ft., NSW, 21 Jan. (1932) Darlington, Harvard Expedition, MCZ type no. 22079 now in ANIC.

Type ♂ of *Triplectides dubius* Mosely, Cradle Mts. Tas., 18 Jan. 1917, R. J. Tillyard (BMNH).

Type ♂ of *Triplectides dubius subalbidus* Kimmins, Hampton, NSW, Jan. 1918 (BMNH).

Other material examined: **New South Wales**—Styx River nr. Ebor, Barrington Tops (specimen PT-853 ♂ figured), Kyeamba, Kananora—Boyd National Park, Mt Kosciusko National Park, Kiandra (specimen PT-871 ♀ figured) (dates between mid-October to mid-January); **Victoria**—Mt Buffalo, Cobungra, Dartmouth, Mt Buller area (dates between mid-October to late-February); **Tasmania**—Cradle Mtn, Wilmot, Great Lake, Andover, Olga River (dates from early December to early-February). Specimens from the collection of ANIC; AM; NMV.

Distribution: E-NSW; NE-Vic; Tas.

Habitat: small to medium size creeks in high country, or fast flowing streams at lower altitude.

Truncatus Group

This group is quite similar to the preceding one. However, the male forewing in these species is more highly modified: the posterior

apical portion of the discoidal cell with its vein swollen and closely parallel to the apex of the thyridial cell; the basal section of S_4 vein is usually indiscernible; the apex of the thyridial cell is very narrow or at least the anterior and posterior veins are close together; the accessory m-cu crossvein often is not evident; there are rows or patches of long, stiff bristles on veins and/or membranes behind the modified apex of the thyridial cell; and in most species the apical thyridial cell membrane forms a small fold above the median vein, sometimes with a pile of many short setae in the resulting pocket.

The male genitalic lobes are all typically long and slender in this group (*T. rossi* an exception) and the harpago is simple, without subapical teeth. The female dorsal setose lobe is broad in lateral view, usually with a small sensilla-bearing process. The gonopod plate is more or less rectangular, the apical ridges (and the pockets above them) transverse.

Triplectides truncatus Neboiss (Figs. 37, 38, 39, 74, 75, 96)

Triplectides truncatus Neboiss, 1977, pp. 129-130, Figs. 699-702.

Body and wings dark brown. Male forewing with swollen posterior apical portion of discoidal cell parallel with narrowed thyridial cell apex; pile-bearing membranous fold of thyridial cell apex overlapping median vein; bristles along Cu_1 vein at thyridial cell apex; base of S_4 vein and accessory m-cu crossvein apparently absent.

Male genitalia (Figs. 74, 75) with superior appendages half as long as segment X, somewhat paddle-shaped in dorsal view. Mesal lobe of each inferior appendage slightly concave apically, corner acute. Some variation from more common form (Fig. 74) noted in this lobe such that mesal process broader and more rounded (Fig. 75b). Phallus gently curved over entire length.

Female genitalia (Fig. 96) generally resembling those of other known species in this group except lamellae nearly triangular in lateral view.

Length of anterior wing: ♂ 10-12 mm; ♀ 11.5-13.5 mm.

Type material: Holotype ♂, Bluff Hill Creek 12 km S of Marrawah, Tas., 30 Nov. 1974, A. Neboiss (NMV); paratypes collected with holotype (specimens PT-495 ♂ and PT-496 ♀ figured).

Other material examined: **Victoria**—Grampians, Warrnambool, Latrobe River, Wilsons Promontory, Meeniyan, Lake Mountain, Kinglake West, Toolangi, Myrtleford, Merrigig, Gibbo River, Mitta Mitta River, dates ranging between end of October and early April; **Tasmania**—all localities situated on the western half of the state—dates between November and February (figured variety—specimen PT-851 ♂ from Olga River, SW-Tas.).

Distribution: Vic.; Tas.

Habitat: fast flowing creeks and rivers.

***Triplectides tambina* Mosely**
(Figs. 40-43, 76, 77, 98)

Triplectides tambina Mosely in Mosely and Kimmins, 1953, pp. 217-219, fig. 146.

Body and wings reddish fuscous with brown hairs. Male forewing venation (Figs. 40-43) similar to that of *T. truncatus*, but discoidal cell shorter, broader subapically, more closely parallel to thyridial cell along modified portion. Few bristles present along Cu_1 vein at modified portion. Base of S_4 vein and accessory m-cu crossvein evident (Fig. 43) or not (Fig. 41).

Male genitalia (Figs. 76, 77) with patch of setae sometimes present on lateral portion of segment IX. Superior appendages slender, little more than half as long as segment X. Tergum X rounded apically and with (Mosely and Kimmins, 1953, Fig. 146) or without (Fig. 77d) apical incision in dorsal view. Apico-dorsal lobe of inferior appendages only 2.5X as long as harpago. Baso-ventral lobe extending beyond apex of harpago. Mesal lobe of inferior appendage narrow, short, truncate and acute (Fig. 76b) or hooked (Fig. 77b) laterally.

Female genitalia (Fig. 98) with sensilla-bearing projections each on a distinct rounded portion below its short, straight dorsal setose lobe. Lamellae rather rectangular in lateral view.

Length of anterior wing: ♂ 11-12 mm; ♀ 12-17 mm.

Type material: Type ♂, Tambourine Mts., Qld., 11-18 Apr. 1935. R. E. Turner (BMNH).

Other material examined: **SE-Queensland**—1 ♂, Cunningham Gap, 21 Sept. 1955, J. Kerr (specimen PT-824 ♂ figured) (NMV); 1 ♂ 3 ♀, Maleny, rainforest, 6 Apr. 1967, N. Dobrotworsky (NMV); 5 ♀, Kenilworth, 7 Apr. 1967, N. Dobrotworsky (NMV); 2 ♂, Bunya Mts., 9 Apr. 1966, I. Burgess (QU) 4 ♂ 1 ♀, same loc., 15 Oct. 1973, A. Neboiss (specimen PT-877 ♀ figured) (NMV); 2 ♂, Saddletree Creek via Maidenwell, 29 Mar. 1975, S. R. Monteith, (specimen PT-845 ♂ figured) (ANIC); **New South Wales**—2 ♀, Wiangaree State Forest via Kyogle, 18 Nov. 1974, S. R. Monteith (ANIC); 1 ♂ 4 ♀, Kangaroo Valley, 22 Mar. 1961, E. F. Rick (ANIC).

Distribution: SE-Qld.; E-NSW.

Habitat: moderately fast flowing creeks.

***Triplectides gonetalus*, n. sp.**
(Figs. 44, 45, 78, 97)

Body and wings generally rufous with brown hairs. Apices of tarsi on forelegs and midlegs and their tarsal segments conspicuously dark brown. Forewings with dark streak along S vein from near wing base to stigma. Patches of light hairs causing irrorate appearance. Male forewing venation (Figs. 44, 45) with very short base of S_4 vein just visible between discoidal and thyridial cells. Accessory m-cu crossvein and fold of apical thyridial cell membrane apparently absent. Stiff bristles along bases of both branches of Cu vein, along apex of P vein and cell behind it just before arculus.

Male genitalia (Fig. 78) resembling those of other species in this group. Apico-dorsal lobe of inferior appendage 3.5X as long as harpago. Baso-ventral lobe extending to middle of harpago. Mesal lobe sometimes visible in lateral view; long, broad, slightly widened apically; apex obliquely subtruncate, slightly convex. Phallus long, straight beyond basal turn.

Female genitalia (Fig. 97) similar to those of *T. tambina*. Dorsal setose lobe short, blunt, its sensilla-bearing process long, situated directly on ridge below lobe. Lamella vaguely trapezoidal in lateral view.

The large size and distinctive colour pattern of this species help make it readily identifiable. The mesal lobe of the inferior appendages resembles those of *T. insperatus* and *T.*

altenogus, but their differing forms are consistent.

Etymology: *gonetalus*—anagram of *elongatus*, after the enjoyable tradition of M. E. Mosely for coining new scientific names.

Length of anterior wing: ♂ 16.5-17.5 mm ♀ 17-18 mm.

Type material: Holotype ♂, Zarda Creek nr. Mt Misery, W of Mossman, 350 m, N-Qld., 23 Dec. 1974, M. S. Moulds (NMV, T-7483); paratypes 2 ♂ 3 ♀, collected with holotype (specimen PT-873 ♀ figured) (NMV); 2 ♂ 1 ♀, 3 km N by E Mt Tiptree (17°02'S 145°37'E), N-Qld., 20 Oct. 1980, J. C. Cardale (specimen PT-836 ♂ figured) (ANIC; NMV); 4 ♂, The Crater nr. Herberton, N-Qld., 18 Dec. 1974, M. S. Moulds (NMV); 2 ♂ 1 ♀, Mt Fisher 8 km SW of Millaa Millaa, N-Qld., 21 Nov. 1979, M. S. and B. J. Moulds (NMV); 4 ♂ 1 ♀, Birthday Creek, 6 km NW by W Paluma, N-Qld., 25 Sept. 1980, J. C. Cardale (ANIC); 2 ♂, Mt Spurgeon, NW of Mossman (near summit, N-Qld., 28 Dec. 1976, M. S. Moulds (NMV); 3 ♂, 25 km along Mt Lewis Road, SW of Mossman, N-Qld., 16 Jan. 1977, M. S. and B. J. Moulds (NMV).

Other material examined: **North Queensland**—1 ♂, Windsor Tableland, NW of Mossman, 6 Jan. 1981, M. S. Moulds (NMV); 1 ♂, Tully Falls, 11 Jan. 1977, M. S. Moulds (NMV); 5 ♂, 1 km N of Tully Falls, 8 Jan. 1976, A. Walford-Huggins (NMV); 1 ♂, Lock-Davis, Ck. road, Lamb Range, Mareeba distr., 10 Nov. 1974, M. S. Moulds (NMV); 2 ♂ 1 ♀, same loc., 25 Dec. 1976, M. S. and B. J. Moulds (NMV); 2 ♂ 2 ♀, Kirama Range via Kennedy, 12 May 1975, Storey and Hancock (NMV). 1 ♂ 1 ♀, Bellenden Ker Range, Summit TV Stn. 1560 m, 1-7 Nov. 1981, Earthwatch survey (QM).

Distribution: N-Qld.

Habitat: moderately fast flowing creeks with calm water pools.

***Triplectides insperatus*, n. sp.**

(Figs. 46, 47, 79)

Body pale yellow. Wings whitish, translucent. Male forewing venation (Figs. 46, 47) with discoidal and thyridial cell veins very closely parallel in modified region. Base of S₄ vein and

accessory m-cu crossvein both absent. Thyridial cell membrane folded over median vein. Nygma elongate. Stiff bristles basally on branches of Cu vein and on veins, and membranes just basad of arculus.

Male genitalia (Fig. 79) with slender superior appendages. Tergum X with pair of low, dorsal carinae; deeply incised apically in dorsal view, but incision joined by thin strip distally in holotype. Base of inferior appendage longer than in *T. gonetalus*, 1.5X as long as harpago; apico-dorsal lobe 2.5X as long as hapago; baso-ventral lobe extending to middle of harpago. Mesal lobe of inferior appendage shorter and straighter than in *T. gonetalus*; apex obliquely truncate with blunt lateral corner. Phallus moderately long, straight beyond base. Female unknown.

This species closely resembles *T. gonetalus*, but is most distinctive in its smaller size, much lighter colour and shorter apico-dorsal and mesal lobes of the inferior appendage.

Etymology: *insperatus*—(Latin) surprise.

Length of anterior wing: ♂ 10 mm.

Type material: Holotype ♂, Cooloola area, open forest, Qld., 28 Aug. 1979, 'K.L.' (NMV, T-7500) (Holotype figured).

Distribution: SE-Qld.

Habitat: slowly flowing coastal creek.

***Triplectides hamatus*, n. sp.**

(Figs. 50, 51, 80)

Body and wings uniformly moderate to dark brown. Male forewing venation (Figs. 50, 51) similar to that of *T. insperatus* except that nygma oblong, accessory m-cu crossvein present but indistinct, and stiff bristles absent.

Male genitalia (Fig. 80) with rounded apex of tergum X narrowly, but deeply incised. Apico-dorsal lobe of inferior appendage 3X as long as harpago; baso-ventral lobe extending to tip of harpago. Mesal lobe of inferior appendage sometimes visible in lateral view; long, divided into 2 equally long processes apically, mesal one rounded, lateral one hooked. Phallus abruptly widened subapically in ventral view, obtusely angled beyond the base in lateral view. Female unknown.

The distinctive mesal lobe of the inferior appendage and the broadened apex of the phallus

of this species are most useful for distinguishing it from others in this group.

Etymology: *hamatus*—(Latin) hooked.

Length of anterior wing: ♂ 12 mm.

Type material: Holotype ♂, Upper Manning River, 20 km NNW of Rawdon Vale, NSW, 31°52'S 151°34'E, 19 Feb. 1980, A. A. Calder (NMV, T-7509) (holotype figured); paratype 1 ♂, Styx River, 12 km S of Ebor, NSW, 17 Oct. 1973, A. Neboiss (NMV).

Distribution: E-NSW.

Habitat: mountain streams.

Triplectides altenogus, n. sp.

(Figs. 48, 49, 81, 99)

Colour of body and wings similar to that of *T. gonetalus*, but paler brown. Male forewing venation (Figs. 48, 49) with modified veins at apex of discal and thyridial cells very closely parallel, together slightly convex anteriorly. Base of S₄ vein and accessory m-cu crossvein apparently absent. Folded thyridial cell membrane with dense pile. Nygma round. Stiff bristles on veins and membrane just basad on arculus.

Male genitalia with slender superior appendages $\frac{3}{4}$ as long as segment X. Segment X slightly incised apically in dorsal view. Apico-dorsal lobe of inferior appendage 3X as long as harpago; baso-ventral lobe reaching just beyond base of harpago. Mesal lobe of inferior appendage long, curved laterally, convex apically; lateral half of apex dark with minute reticulation; dorsal surface with high ridge, phallus moderately long, nearly straight beyond slight basal curve, slightly widened apically in ventral view.

Female genitalia (Fig. 99) with straight, blunt dorsal setose lobes each shorter than its sensilla-bearing process. Lamella subrectangular, rounded apically in lateral view. Spermathecal sclerite apparently highly deformed in only known female specimen.

The mesal lobe of the inferior appendage in this species resembles that of *T. gonetalus*, but its shape is clearly and consistently different.

Etymology: *altenogus*—anagram of *elongatus*.

Length of anterior wing: ♂ 15.5-16 mm; ♀ 15.5-16.5 mm.

Type material: Holotype ♂, Peter's Creek, (26°41'S 152°36'E) Conondale Range via Bellthorpe, Qld., 29 Nov. 1974, S. R. Monteith (ANIC); paratypes 5 ♂ (specimen PT-835 ♂ figured), collected with holotype (ANIC; NMV); 1 ♂, Mt Mee, Qld., 9 Jan. 1971, S. R. Monteith (ANIC); 1 ♂ 1 ♀, Saddletree Creek via Maidenwell, Qld., 29 Mar. 1975, S. R. Monteith (specimen PT-872 ♀ figured) (ANIC); 2 ♂, Flaggy Creek, Mistake Mtn. via Laidley, Qld., 11 Feb. 1973, S. R. Monteith (ANIC).

Other material examined: **New South Wales**—2 ♂, Kangaroo Valley, 22 Mar. 1961, E. F. Riek (ANIC); 1 ♂, Tenterfield, 20 Feb. 1975, (collector unknown) (NMV); **Victoria**—1 ♂, Back Creek above Cann River junction, 9 Feb. 1980, A. Wells (NMV).

Distribution: SE-Qld.; E-NSW; E-Vic.

Habitat: small, fast flowing creeks.

Triplectides rossi, n. sp.

(Figs. 52, 53, 82, 100)

Body and wings pale brown, stigma darker. Male forewing venation (Figs. 52, 53) most highly modified of *Truncatus* Group. Base of S₄ vein apparently absent; accessory m-cu vein indistinct. Pile-laden membranous fold broad, touching discoidal cell vein. Stiff bristles possibly along several veins in middle of wing, but apparently rubbed off specimen illustrated.

Male genitalia (Fig. 82) with short, somewhat spatulate superior appendages. Segment X short, truncate in both dorsal and lateral views. Apico-dorsal lobe of inferior appendage only 2.25X as long as harpago; baso-ventral lobe just reaching base of harpago. Mesal lobe of inferior appendage broad basally, tapering to 2 distally pointing rounded projections. Phallus gradually widening to apex in both lateral and ventral views.

Female genitalia (Fig. 100) with very short dorsal setose lobe apparently without sensilla-bearing projection. Lamella with ventral edge semicircular, margined.

The shorter genital appendages in the 2 sexes and the distinctive male forewing venation and mesal lobe of each inferior appendage clearly distinguish this species from other members of the *Truncatus* Group.

Etymology: *rossi*—for the late Prof. Herbert H. Ross whose interest in the Australian cad-disflies and their transantarctic relationships provided the initial impetus to undertake this study.

Length of anterior wing: ♂ 10-12 mm; ♀ 12-13.5 mm.

Type material: Holotype ♂, Mt Fisher, 8 km SW of Millaa Millaa, N-Qld., 21 Nov. 1979, M. S. and B. J. Moulds (NMV, T-7491); paratypes 2 ♀, collected with holotype (specimen PT-875 ♀ figured) (NMV); 2 ♂, Kirrama State Forest, (Western fall), N-Qld., 30 May 1971, E. F. Riek (specimen PT-838 ♂ figured) (ANIC; NMV); 1 ♂, Moses Creek, 4 km N by E of Mt Finnigan, N-Qld., 14-16 Oct. 1980, J. C. Cardale (ANIC); 1 ♂, Lock-Davies Creek Road, Lamb Range, Mareeba district, N-Qld., 10 Nov. 1974, M. S. Moulds (NMV); 1 ♂, same loc., 25 Dec. 1976, M. S. and B. J. Moulds (NMV); 1 ♀, Kirrama State Forest, 24 km WNW of Kennedy, N-Qld., 28 Jan. 1981, M. S. and B. J. Moulds (NMV); 1 ♂, Bellenden Ker Range, ½ km S Cable Tower No 7, 500 m, 25-31 Oct. 1981, Earthwatch survey (QM); 2 ♂, Bellenden Ker Range, Summit TV Stn. 1560 m, 1-7 Nov. 1981, Earthwatch survey (QM; NMV).

Distribution: N-Qld.

Habitat: small, fast flowing creeks.

KEY TO MALES OF AUSTRALIAN
TRIPLECTIDES SPECIES

1. Spurs 2, 2, 2 2
- Spurs 2, 2, 4 (at least on one side) 9
2. Segment X with only rounded latero-ventral margins *Australis* Group, 2
- Segment X with pair of longitudinal dorsal or ventral carinae 7
3. Apex of phallus tapered in ventral view 4
- Apex of phallus parallel-sided or gradually widening in ventral view 5
4. Harpago with subapical tooth on dorsal and ventral edges; mesal lobe of inferior appendage broad (Fig. 54b); Australia except Tasmania *australis* Navás
- Harpago without subapical teeth; mesal lobe of inferior appendage narrow (Fig. 55b); transcontinental northern Australia *helvolus*, n. sp.
5. Large dark species, forewing 15-18 mm long; mesal lobe of inferior appendage very broad, blunt lateral corner clearly projecting beyond rest of lobe (Fig. 56b); S-Tas., S-Vic. *magnus* (Walker)
- Smaller, pale grey to pale brown, forewing 10-13 mm long; apex of mesal lobe of inferior appendage rounded or truncate (Fig. 58b) or concave (Fig. 57b) with acute lateral corner 6
6. Apex of mesal lobe of inferior appendage concave (Figs. 57b', 57) or sinuous (Fig. 57g), lateral corner usually small; hindwing S₁ vein usually present; Qld., northern NT *parvus* (Banks)
- Apex of mesal lobe of inferior appendage rounded or truncate, lateral corner prominent (Fig. 58b); hindwing S₁ vein usually reduced or absent; Qld., NSW, Vic. *volda* Mosely
7. Segment X with pair of ventral carinae (Figs. 62a 63a); apex of mesal lobe of inferior appendage subtruncate with prominent lateral corner (Fig. 62b); wings uniformly brown; eyes always small 8
- Segment X with pair of dorsal carinae (Figs. 65a, 66a); mesal lobe of inferior appendage triangular with blunt apex (Figs. 65b, 66b) wings patterned with light and dark brown; eyes often large; SE Qld. to SA, Tas *similis* Mosely
8. Ventral carinae of segment X sinuate, angled or projecting in lateral view (Fig. 62a); Australia except W.A. *ciuskus ciuskus* Mosely
- Ventral carinae of segment X evenly convex (Fig. 63a); NW Australia, NT *ciuskus seductus*, n. subsp.
9. Harpago serrate on ventral edge subapically (Figs. 59b, 60b)
- Harpago with single tooth (Fig. 61b) or with abruptly broad region (Fig. 89b) subapically Proximus Group 10
- Harpago with single tooth (Fig. 61b) or with abruptly broad region (Fig. 89b) subapically 11

- 10. Mesal lobe of inferior appendage with mesal projection much narrower than lateral projection (Fig. 59b); baso-ventral lobe short, out-turned; W. Tas. *bilobus* Neboiss
 - Mesal lobe of inferior appendage with mesal projection broader than lateral projection (Fig. 60b); baso-ventral lobe long, straight; N. Tas., E. Vic., SE NSW *proximus* Neboiss
- 11. Segment X with longitudinal pair of sinuate ventral carinae (Figs. 61a, 64a; mesal lobe of inferior appendage truncate (Figs. 61b', 64b) 12
 - Segment X without pair of ventral carinae 13
- 12. Superior appendages broad basally in dorsal view (Fig. 61d), acute apex as long as base and baso-ventral lobe of inferior appendage; Qld., NSW, Vic., N WA *australicus* Banks
 - Superior appendages slender, shorter than base and baso-ventral process of inferior appendage (Fig. 64a), SW Australia *enthesi* Neboiss
- 13. Baso-ventral lobe of inferior appendage extending only half the distance to the base of the harpago (Fig. 67b); superior appendages short, broad (Fig. 67a); SW Australia *niveipennis* Mosely
 - Baso-ventral lobe of inferior appendage extending at least most of the distance to the base of the harpago (Fig. 70b); superior appendages slender at least basally (Fig. 82d) 14
- 14. Posterior apical portion of discoidal cell with vein of uniform thickness and pigmentation (Fig. 26); basal section of S₄ vein between discoidal and thyridial cells present, though short; apical thyridial cell membrane not folded over M vein *Elongatus* Group, 15
 - Posterior apical portion of discoidal cell with vein swollen, darker or less translucent (Fig. 38); basal section of S₄ vein usually absent; apical thyridial cell membrane usually folded over M-vein *Truncatus* Group, 20
- 15. Ventral edge of harpago conspicuously broadened in middle (Figs. 68b, 69b, 70b) 16
 - Ventral edge of harpago straight or slightly curved (Fig. 71b) 18
- 16. Harpago without apical teeth (Fig. 68b); baso-ventral process of inferior appendage long, extending to middle of harpago; mesal lobe of inferior appendage with large lateral process triangular, acute apically; tergum X without sharp longitudinal carinae (Figs. 68a, 68d); N Qld. *prolatus*, n. sp.
 - Harpago with 2 apical teeth (Figs. 69b, 70b); baso-ventral process of inferior appendage at most reaching base of harpago; mesal lobe of inferior appendage with lateral process tiny (Fig. 69b) or blunt (Fig. 70b); tergum X with longitudinal carinae 17
- 17. Mesal lobe of inferior appendage with tiny baso-lateral process (Fig. 69b); ventral edge of harpago narrowed below broad middle; N Qld. *liratus*, n. sp.
 - Mesal lobe of inferior appendage with large, blunt baso-lateral process (Fig. 70b); ventral edge of harpago uniformly broad along basal 2/3; N Qld. *liratellus*, n. sp.
- 18. Mesal lobe of inferior appendage truncate (Fig. 71b); harpago slightly sinuous; SE NSW, Vic. *varius* Kimmins
 - Mesal lobe of inferior appendage triangular (Fig. 73b) or with conspicuous mesal and lateral projections (Fig. 72b); harpago gradually and evenly curved to apex 19
- 19. Mesal lobe of inferior appendage with conspicuous mesal and lateral projections (Fig. 72b); N Qld. *dolabratus*, n. sp.
 - Mesal lobe of inferior appendage triangular (Fig. 73b); E NSW NE Vic., Tas. *elongatus* Banks
- 20. Mesal lobe of inferior appendage with mesal portion of apex as large as, or larger than, lateral projection (Figs. 74b, 75b, 80b, 82b) 21

- Mesal lobe with mesal portion small (Figs. 77b, 81b) or not evident in ventral view (Figs. 76b, 78b, 79b) 23
- 21. Apex of mesal lobe subtruncate, slightly concave, without a clearly differentiated mesal projection in ventral view (Figs. 74b, 75b); Vic., Tas. *truncatus* Neboiss
 - Apex of mesal lobe clearly differentiated from lateral projection by deep excision (Figs. 80b, 82b) 22
- 22. Lateral projection of mesal process of inferior appendage hooked laterally (Fig. 80b); baso-ventral process of inferior appendage extending to tip of harpago; E NSW
 - *hamatus*, n. sp.
 - Lateral projection of mesal process of inferior appendage bluntly pointed posteriorly (Fig. 82b); baso-ventral process of inferior appendage just reaching base of harpago; N Qld *rossi*, n. sp.
- 23. Mesal lobe of inferior appendage small, apically truncate (Figs. 76b, 77b); baso-ventral lobe extending beyond tip of harpago; SE Qld, E NSW *tambina* Mosely
 - Mesal lobe of inferior appendage nearly as broad as base of inferior appendage, mesal corner much more distal than lateral corner (Figs. 78b, 79b, 81b); baso-ventral lobe of inferior appendage reaching only to middle of harpago 24
- 24. Large brown species, forewing more than 15 mm long; Mesal lobe of inferior appendage at least as long as its obliquely convex apex (Figs. 78b, 81b) 25
 - Smaller, pale yellow species, forewing 10 mm long; mesal lobe of inferior appendage with outer lateral margin shorter than obliquely straight apex (Fig. 79b); SE Qld. *insperatus*, n. sp.
- 25. Forewing 17.5 mm; mesal lobe of inferior appendage with only small apico-lateral corner dark, rugous (Fig. 78b); N Qld *gonetalus*, n. sp.

- Forewing 15.5 mm; mesal lobe of inferior appendage with lateral half of apex dark, rugous (Fig. 81b); SE Qld., E NSW, E Vic. *altenogus*, n. sp.

KEY TO FEMALES OF AUSTRALIAN
TRIPLECTIDES SPECIES

- (Females of *T. niveipennis*; Elongatus Group—*T. prolatus*, *T. liratellus*, *T. varius* and *T. dolabratus*; and Truncatus Group—*T. insperatus* and *T. hamatus* are unknown.)
1. Spurs 2, 2, 2 2
 - Spurs 2, 2, 4 (at least on one side) 8
 2. Dorsal setose lobe longer than weakly sclerotized lamella (Fig. 83a), sensilla-bearing process often forming sclerotized plate below dorsal setose lobe (Fig. 86b); viviparous Australis Group, 3
 - Dorsal setose lobe shorter than strongly sclerotized lamella (Fig. 90a); sensilla-bearing process a small, slender projection; oviparous 7
 3. Sensilla-bearing process slender, acute, semimembraneous, longer than dorsal setose lobe (Figs. 83a, 83b); Australia except Tas.
 - *australis* Navás
 - Sensilla-bearing process broader, blunt, truncate, or plate-like, well sclerotized, shorter than dorsal setose lobe (Figs. 84-87) 4
 4. Sensilla-bearing process truncate, with short apical setae (Fig. 84); transcontinental northern Australia *helvolus*, n. sp.
 - Sensilla-bearing process blunt (Fig. 85b) or plate-like (Figs. 86b, 87b) 5
 5. Large, dark species, forewing 17-18 mm long; sensilla-bearing process triangular, with blunt apex (Fig. 85b); S Tas., S Vic. *magnus* (Walker)
 - Small, pale species, forewing 10-13 mm long; sensilla-bearing process plate-like (Figs. 86b, 87b) 6
 6. Sensilla-bearing plate more or less rectangular in ventral view (Fig. 86b); lateral portion of segment IX with 2 well-marked carinae (Fig.

- 86a); hindwing S_1 vein usually present; Qld., northern NT . . . *parvus* (Banks)
- Sensilla-bearing plate more or less triangular, often with small projection near mesal base (Fig. 87b); lateral portion of segment IX with caudal carina weak or absent (Fig. 87a) hindwing S_1 vein usually absent; Qld., NSW, Vic. *volda* Mosely
7. Dorsal setose lobe with upper margin convex in lateral view (Fig. 91a); lamella without setae; wings uniformly brown; Australia except SW Australia *ciuskus* Mosely
- Dorsal setose lobe with upper margin straight in lateral view (Fig. 93a); lamella setose; forewings patterned with light and dark brown hairs; SE Qld. to SA, Tas. *similis* Mosely
8. Sensilla-bearing process absent (Figs. 88a, 89a, 94a, 100a) 9
- Sensilla-bearing process present (e.g. Fig. 90a) 12
9. Dorsal setose lobe very short; lamella with ventral edge semicircular and margined (Fig. 100a); N Qld. . . *rossi*, n. sp.
- Dorsal setose lobe long, slender or paddle-shaped (Figs. 88, 89, 94); lamella finger-like (Fig. 88a), triangular (Fig. 89a), or rectangular (Fig. 94a) in lateral view 10
10. Lamella finger-like or triangular, lacking conspicuous setae (Figs. 88, 89); a distinct semimembranous lobe projecting below ventral edge of lamella Proximus Group, 11
- Lamella rectangular (Fig. 94a) in lateral view, with fine setae, and without semimembranous lobe ventrally; N Qld. *liratus*, n. sp.
11. Lamella finger-like in lateral view (Fig. 88a), twice as long as broad basally; gonopod plate with evident transverse striae (Fig. 88b); W Tas. *bilobus* Neboiss
- Lamella triangular in lateral view (Fig. 89a) as long as broad basally; gonopod plate without striae (Fig. 89b); N Tas., E Vic., SE NSW *proximus* Neboiss
12. Dorsal setose lobe straight, narrow (Fig. 90a); lamella without setae; spermathecal sclerite rectangular (Fig. 90b); Qld., NSW, Vic., N WA *australicus* Banks
- Dorsal setose lobe with convex upper margin in lateral view or broader (Fig. 96a); if straight and narrow, lamella setose (Fig. 92a; spermathecal sclerite more triangular 13
13. Sensilla-bearing process tiny, situated on lower mesal surface of dorsal setose process (Fig. 92a); SW Australia *enthesi* Neboiss
- Sensilla-bearing process conspicuous, usually situated on ridge below dorsal setose lobe (Fig. 96a) 14
14. Gonopod plate triangular, the apico-lateral ridges and the pockets above them converging posteriorly (Fig. 95b); E NSW, NE Vic., Tas.
- *elongatus* Banks
 - Gonopod plate rectangular, the apical ridges and the pockets above them forming a more nearly straight transverse line 15
15. Lamella nearly triangular in lateral view (Fig. 96a); Vic., Tas.
- *truncatus* Neboiss
 - Lamella rectangular (Fig. 98a) or trapezoidal (Fig. 97a) in lateral view 16
16. Sensilla-bearing process situated on distinct rounded ridge below dorsal setose lobe (Fig. 98a); SE Qld., E NSW *tambina* Mosely
- Sensilla-bearing process situated directly on ridge below dorsal setose lobe (Fig. 97a); lamella somewhat trapezoidal; N Qld *gonetalus*, n. sp.
 - Sensilla-bearing process situated mesad of ridge below dorsal setose lobe (Fig. 99a); lamella subrectangular, rounded apically in lateral view; SE Qld., E NSW, E Vic. *altenogus*, n. sp.

Acknowledgements

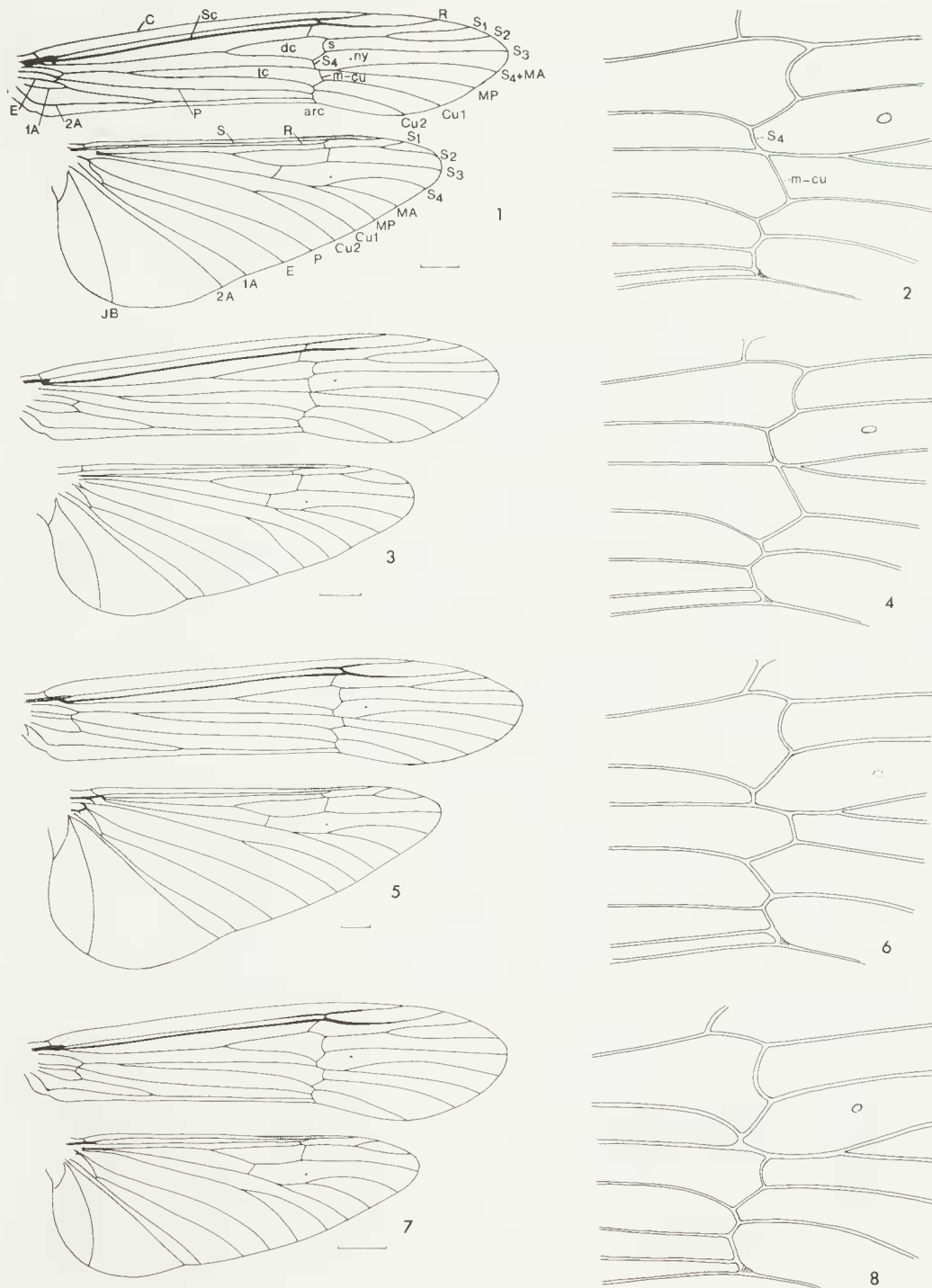
We are particularly grateful to the National Museum of Victoria Council whose sponsorship of JCM's 4-month appointment to the Museum's Department of Entomology made this investigation possible. The museum's staff, especially Miss Elizabeth Matheson, Mr. Kenneth Walker and Miss Heather Martin, generously took time from other duties to help the project proceed smoothly.

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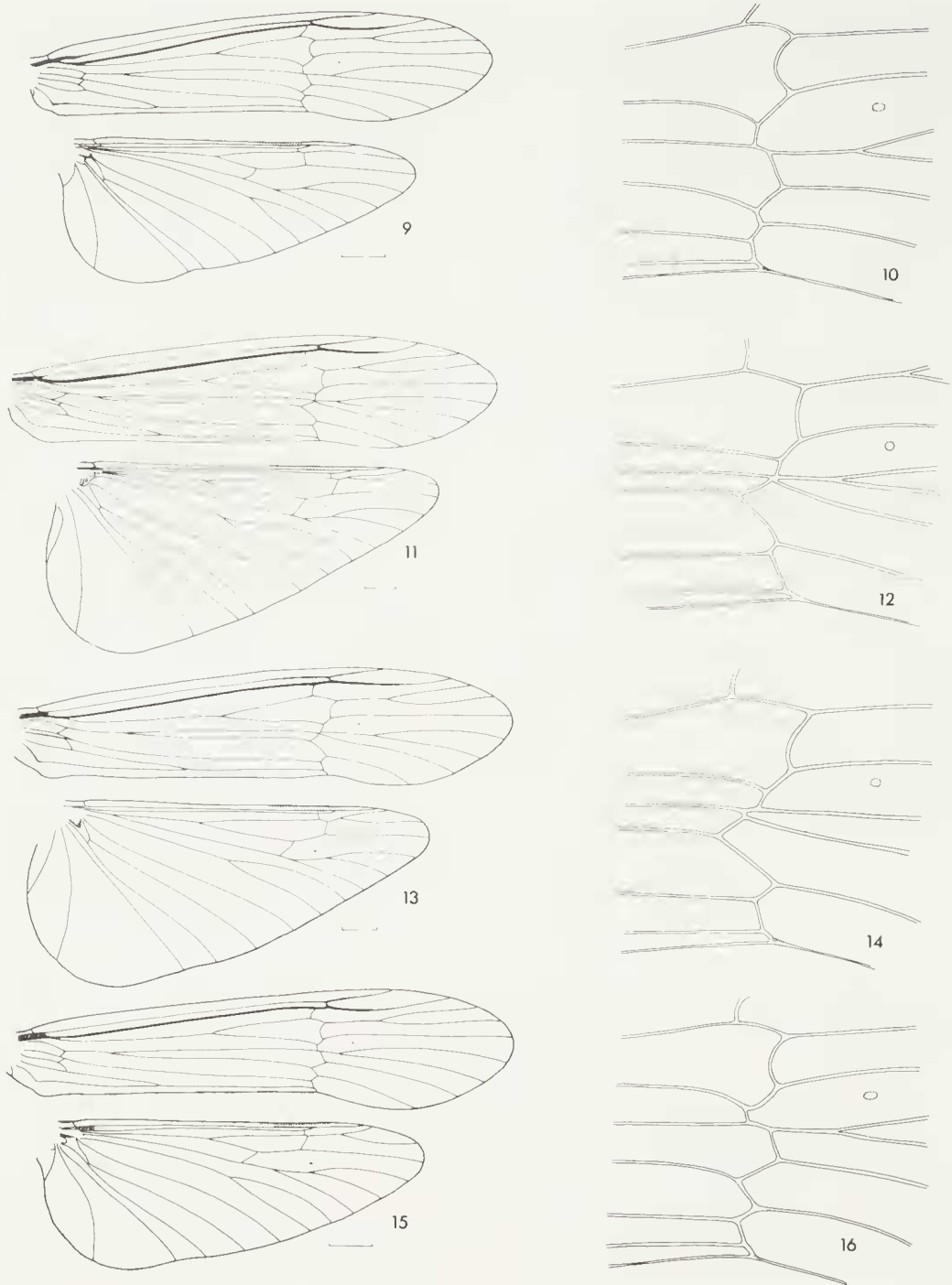
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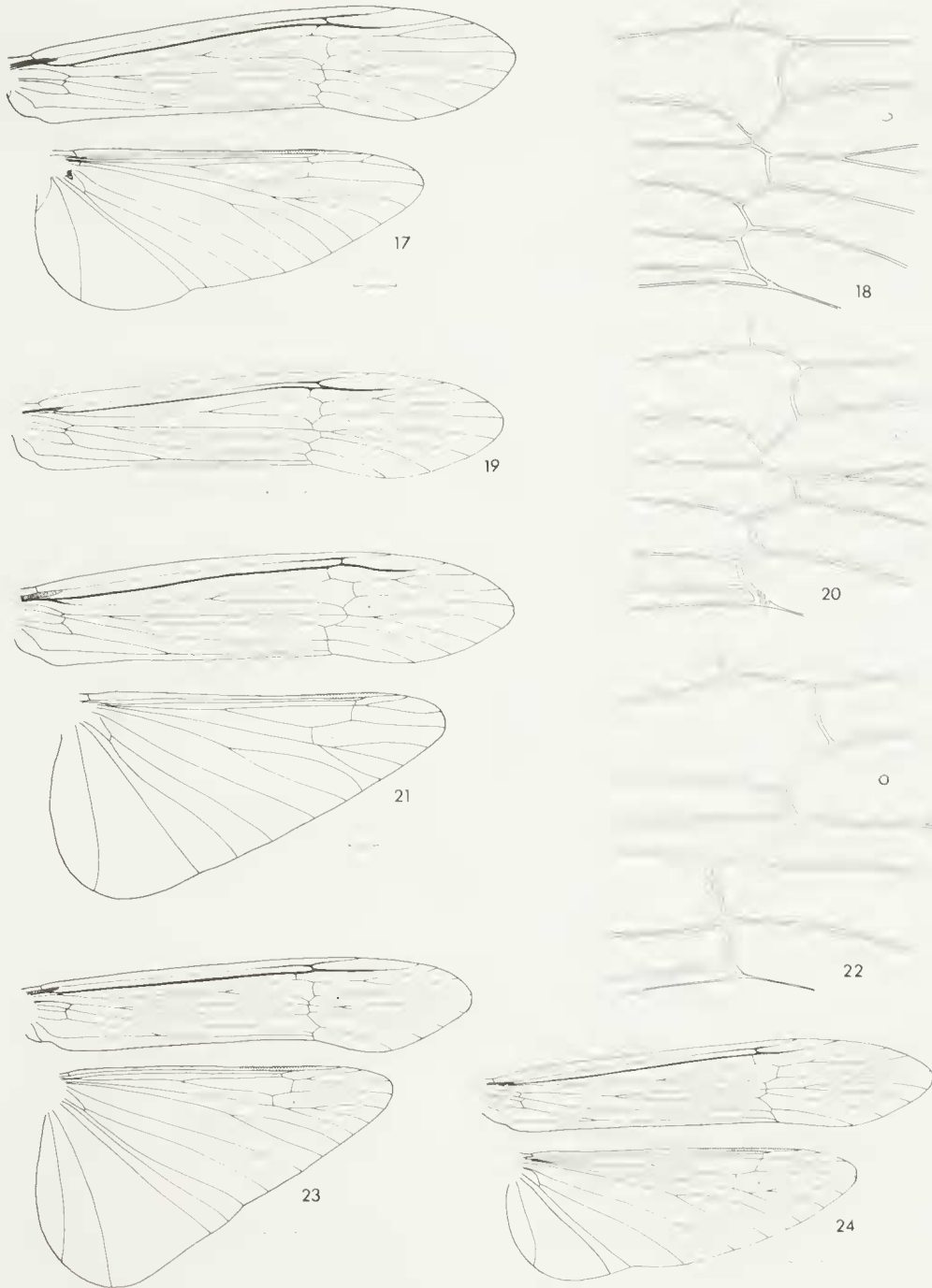
Figs. 1-8. male wing venation: Figs. 1-2 *Triplectides australis* Navás, Lake Hindmarsh, Vic. (PT-830); Figs. 3-4 *Triplectides helvolus* Morse and Neboiss, paratype, East Alligator

River, N.T. (PT-842); Figs. 5-6 *Triplectides magnus* (Walker), Lake Pedder, Tas. (PT-314); Figs. 7-8 *Triplectides parvus* (Banks), Upper Freshwater Creek, N-Qld.



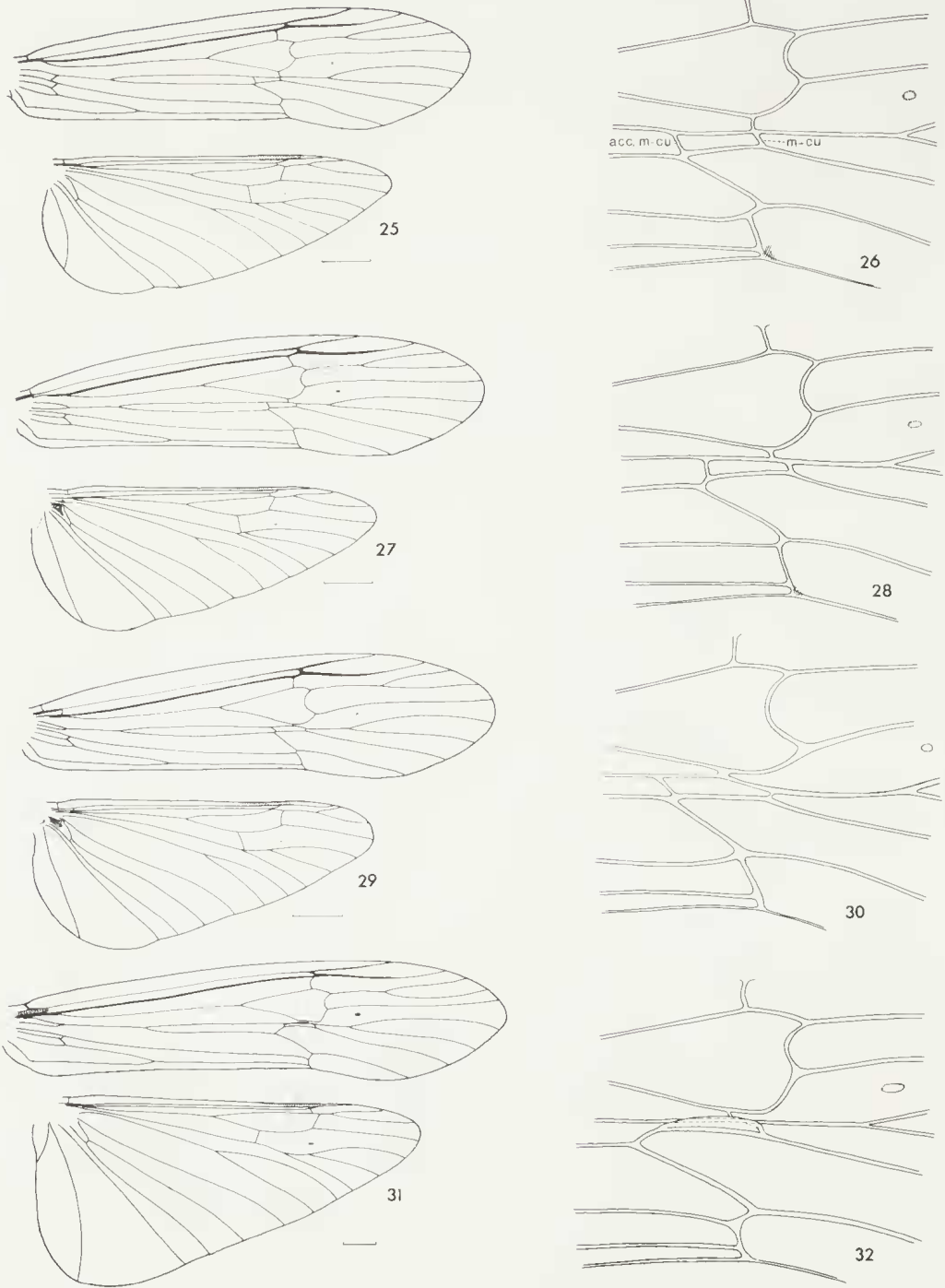
Figs. 9-16. male wing venation: Figs. 9-10 *Triplectides volda* Mosely, Camp Mountain, Qld.; Figs. 11-12 *Triplectides bilobus* Neboiss, paratype, Franklin River, Tas. (PT-309); Figs. 13-14

Triplectides proximus Neboiss, paratype, Leven River, Tas. (PT-218); Figs. 15-16 *Triplectides australicus* Banks, Cairns, Qld. (PT-855).



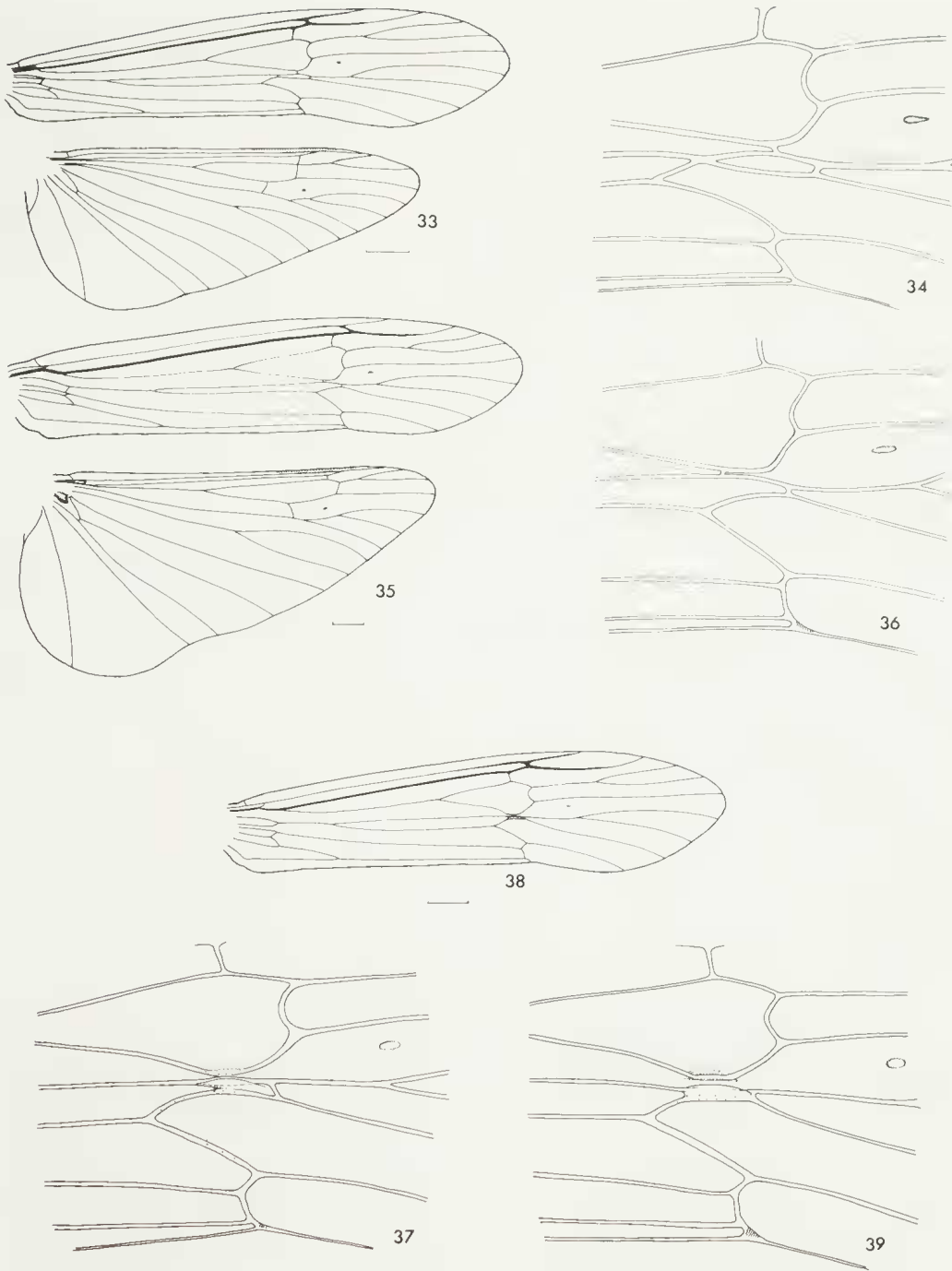
Figs. 17-24. male wing venation: Figs. 17-18 *Triplectides ciuskus* Mosely, Dart-Mitta River junction, Vic. (PT-856); Figs. 19-20 *Triplectides ciuskus seductus* Morse and Neboiss, paratype, Mitchell Plateau, NWA (PT-857); Figs. 21-22 *Triplectides similis* Mosely (large eyed form), Sundown Creek, Marrawah,

Tas.; Fig. 23 *Triplectides niveipennis* Mosely, paratype, Yanchep, W.A. (redrawn from Mosely and Kimmins 1953); Fig. 24 *Triplectides enthesis* Neboiss, holotype, Beedclup Falls, W.A. (from dry, only partly denuded wing).



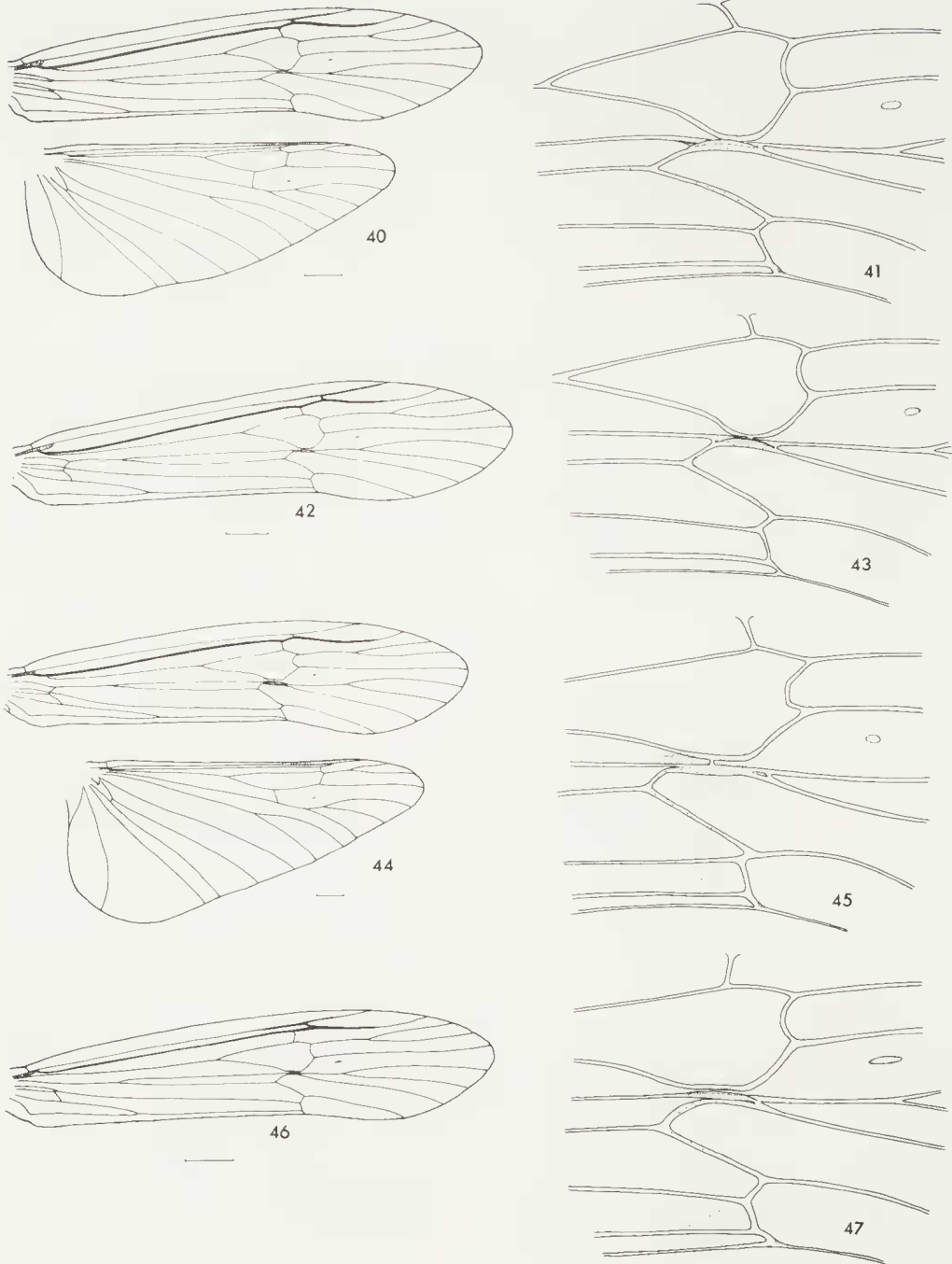
Figs. 25-32. male wing venation: Figs. 25-26 *Triplectides prolatus* Morse and Neboiss, paratype, Crystal Cascades, Cairns N-Qld., (PT-841); Figs. 27-28, *Triplectides liratus* Morse and Neboiss, paratype, Moses Creek, N-Qld.

(PT-837); Figs. 29-30 *Triplectides lirattellus* Morse and Neboiss, paratype, Babinda, N-Qld. (PT-839); Figs. 31-32, *Triplectides varius* Kimmins, Mt. Kosciusko, NSW. (PT-846).



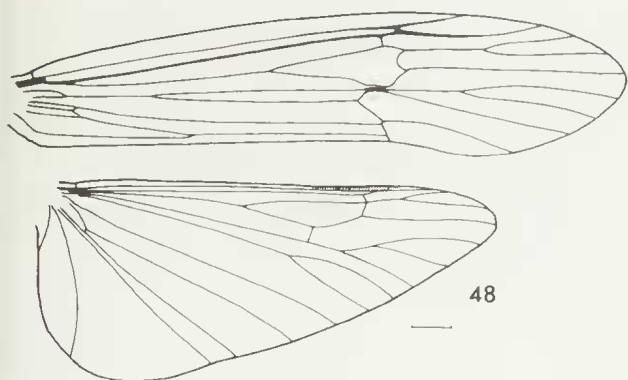
Figs. 33-39. male wing venation: Figs. 33-34, *Triplectides dolabratus* Morse and Neboiss, paratype, Tully Falls, N-Qld. (PT-843); Figs. 35-36, *Triplectides elongatus* Banks, Barrington

Tops, NSW (PT-853); Fig. 37, *Triplectides truncatus* Neboiss, paratype, Bluff Hill Creek, Tas. (PT-495); Figs. 38-39, *Triplectides truncatus* var. Toolangi, Vic. (PT-852).

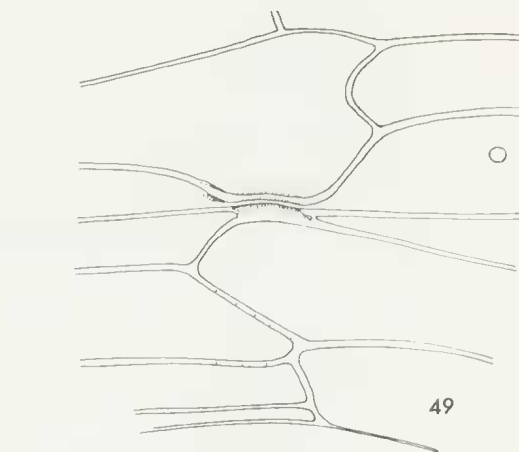


Figs. 40-47. male wing venation: Figs. 40-41, *Triplectides tambina* Mosely, Cunningham Gap, Qld. (PT-824); Figs. 42-43, *Triplectides tambina* var. Saddletree Creek, Maidenwell, Qld. (PT-845); Figs. 44-45, *Triplectides gonetalus*

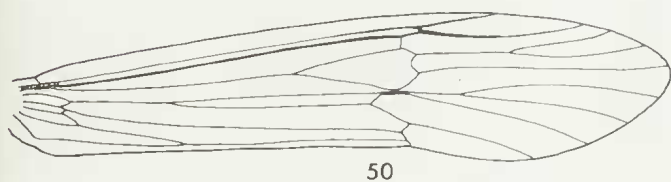
Morse and Neboiss, paratype, Mt. Tiptree, N-Qld (PT-836); Figs. 46-47, *Triplectides insperatus* Morse and Neboiss, holotype, Cooloola, Qld. (PT-840).



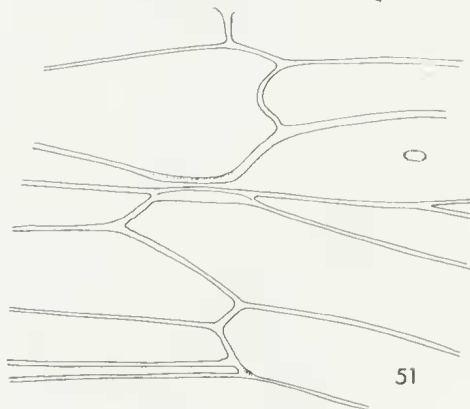
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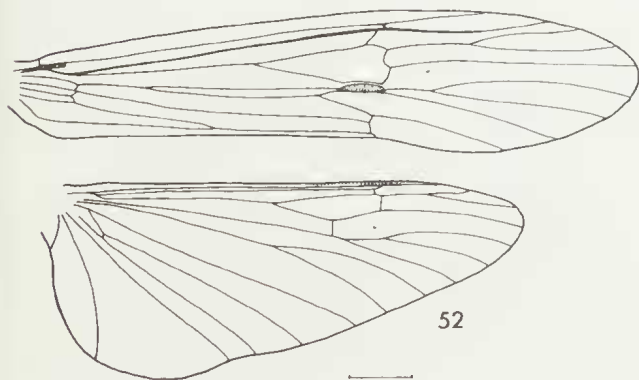
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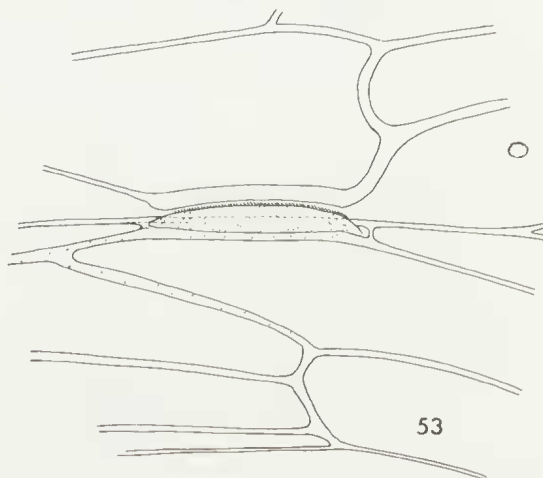
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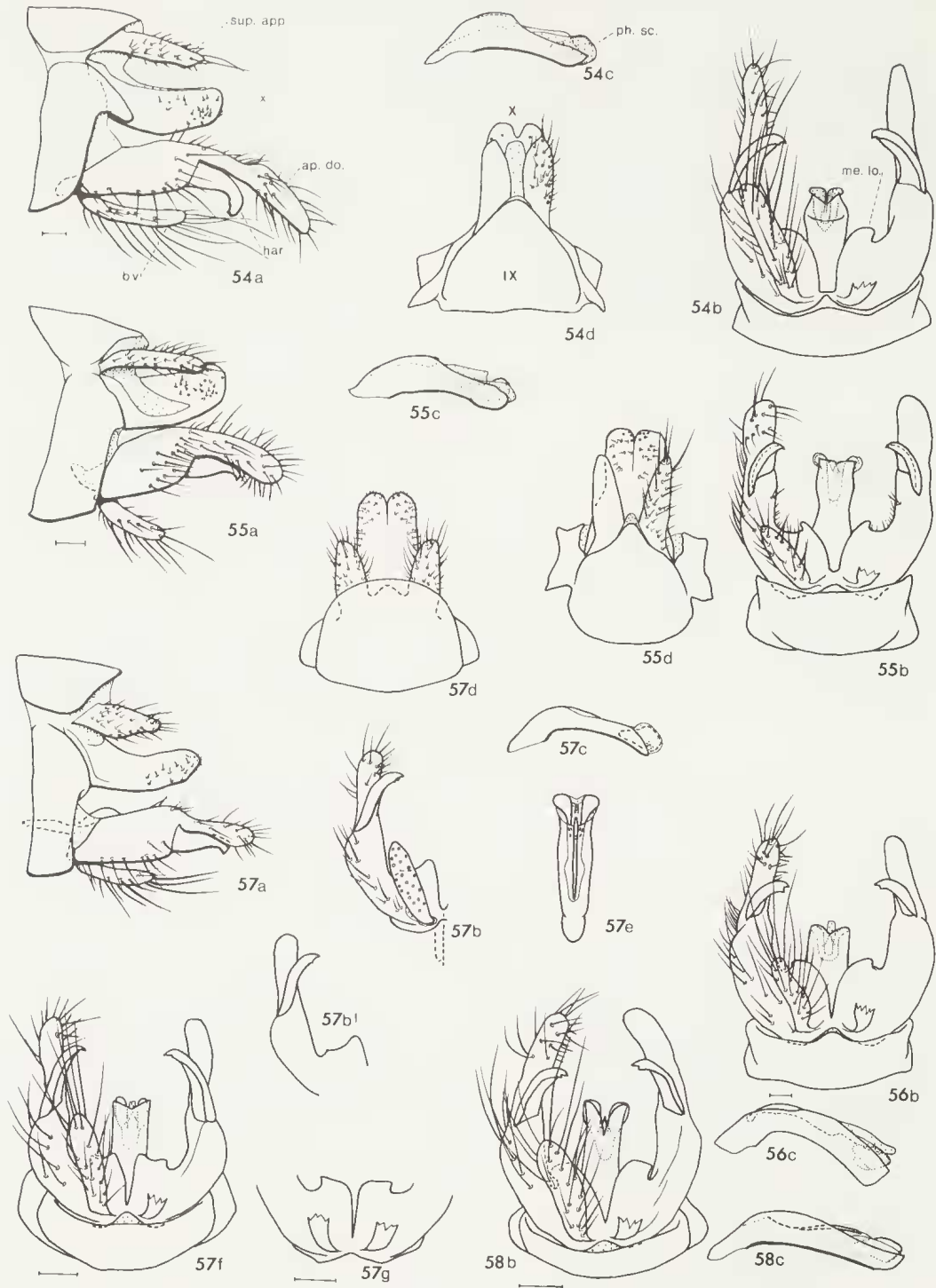
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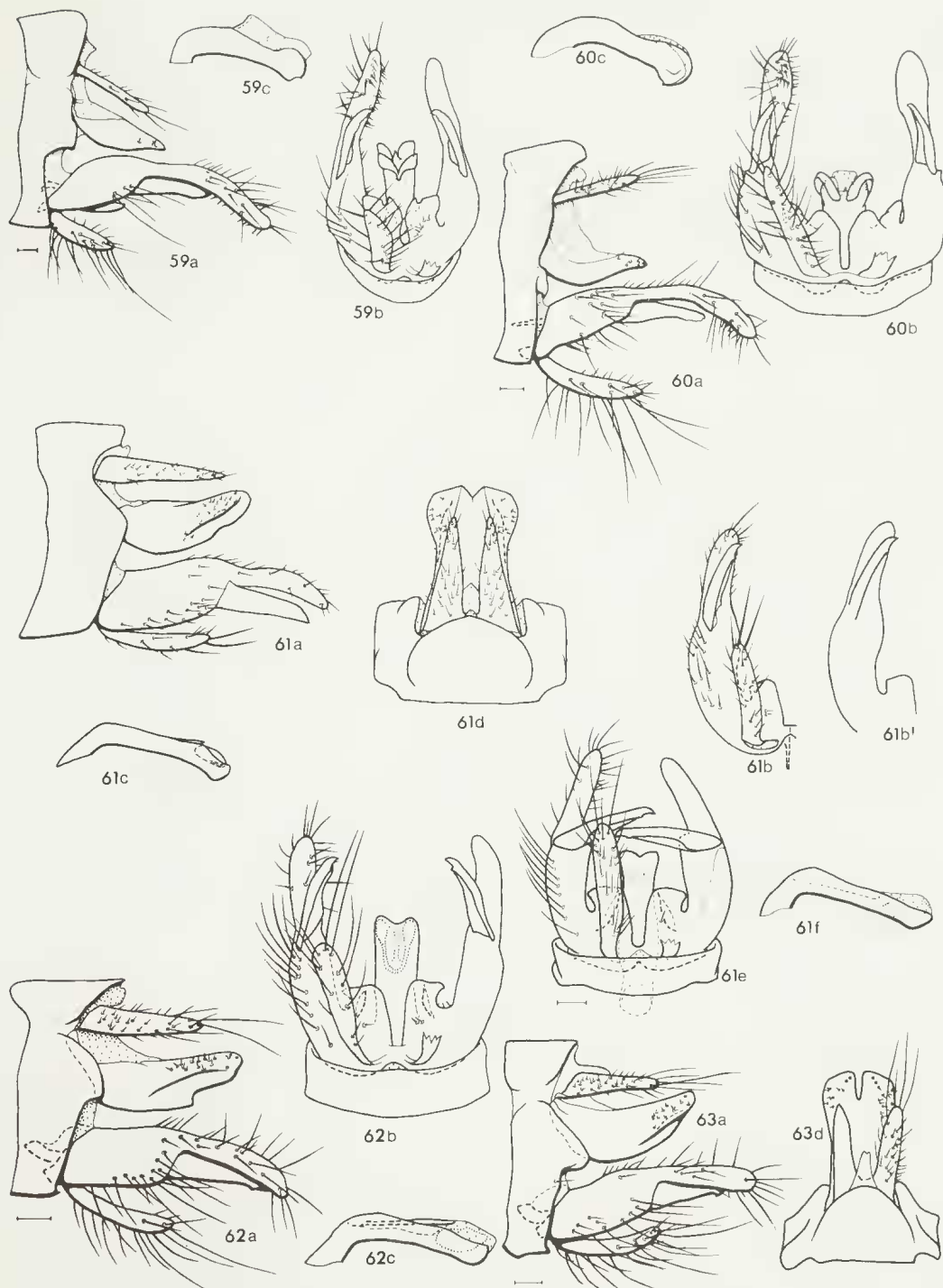
Figs. 48-53. male wing venation: Figs. 48-49, *Triplectides altenogus* Morse and Neboiss, paratype, Conondale Range, SE-Qld. (PT-835); Figs. 50-51, *Triplectides hamatus* Morse and Neboiss,

holotype, Upper Manning River, NSW (PT-844); Figs. 52-53, *Triplectides rossii* Morse and Neboiss, paratype, Kirrama State Forest, N-Qld. (PT-838).



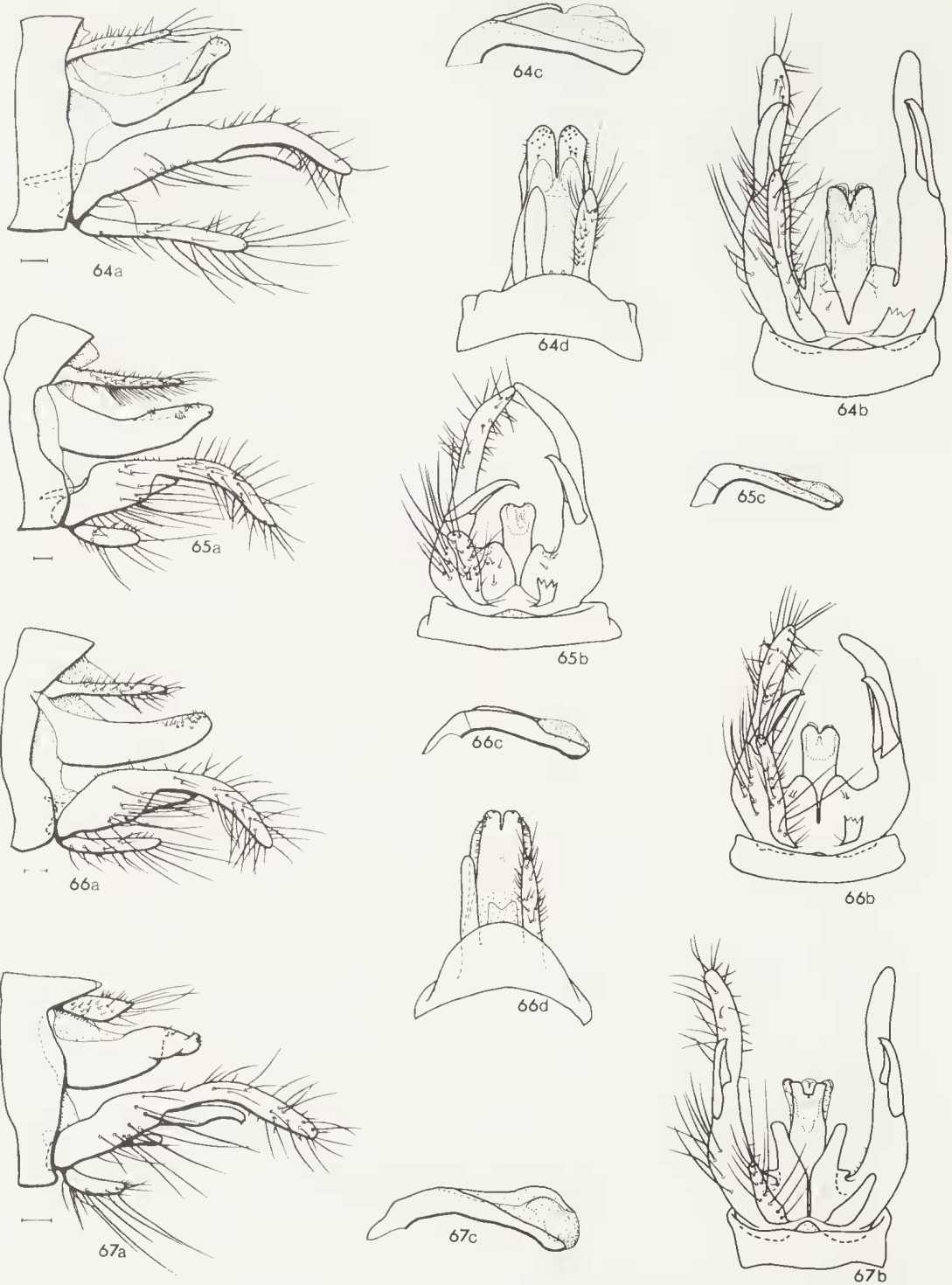
Figs. 54-58. male genitalia: Fig. 54 a, b, c, d, *Triplectides australis* Navás, Jindabyne, NSW. (PT-849); Fig. 55 a, b, c, d, *Triplectides helvolus* Morse and Neboiss, paratype, East Alligator River, NT. (PT-842); Fig. 56 b, c, *Triplectides magnus* (Walker), Lake Pedder, SW-Tas. (PT-314); Fig. 57 a, b, b', c, d, e, *Triplectides*

parvus (Banks), holotype, Ravenshoe, N-Qld., f-male from Kenilworth, SE-Qld. (PT-823) ventral, g-male from Holmes Jungle, Darwin, NT. ventral; Fig. 58 b, c, *Triplectides volda* Mosely, Camp Mountain SE-Qld. (PT-850).



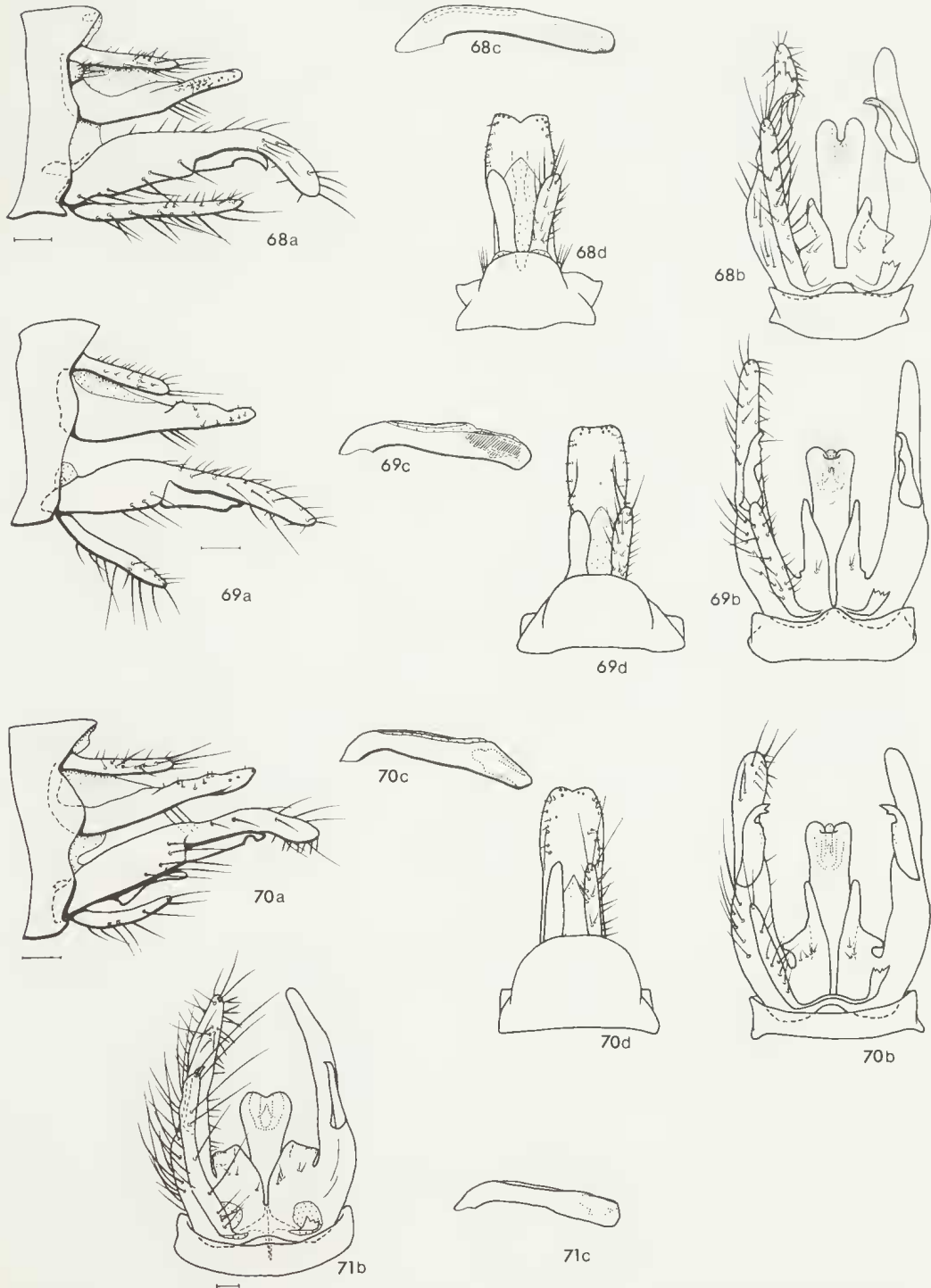
Figs. 59-63. male genitalia: Fig. 59 a, b, c, *Triplectides bilobus* Neboiss, paratype, Franklin River, SW-Tas. (PT-309); Fig. 60 a, b, c, *Triplectides proximus* Neboiss, paratype, Leven River, Heka, Tas. (PT-218); Fig. 61 a, b, b', c, d, *Triplectides australicus* Banks, holotype, Ravenshoe, N-Qld., e-male from Cairns

(PT-855) ventral, f-phallus lateral; Fig. 62 a, b, c, *Triplectides ciuskus* Mosely, Dartmouth, Vic. (PT-856); Fig. 63 a, d, *Triplectides ciuskus seductus* Morse and Neboiss, paratype, Camp Creek, Mitchell Plateau, NWA (PT-858).



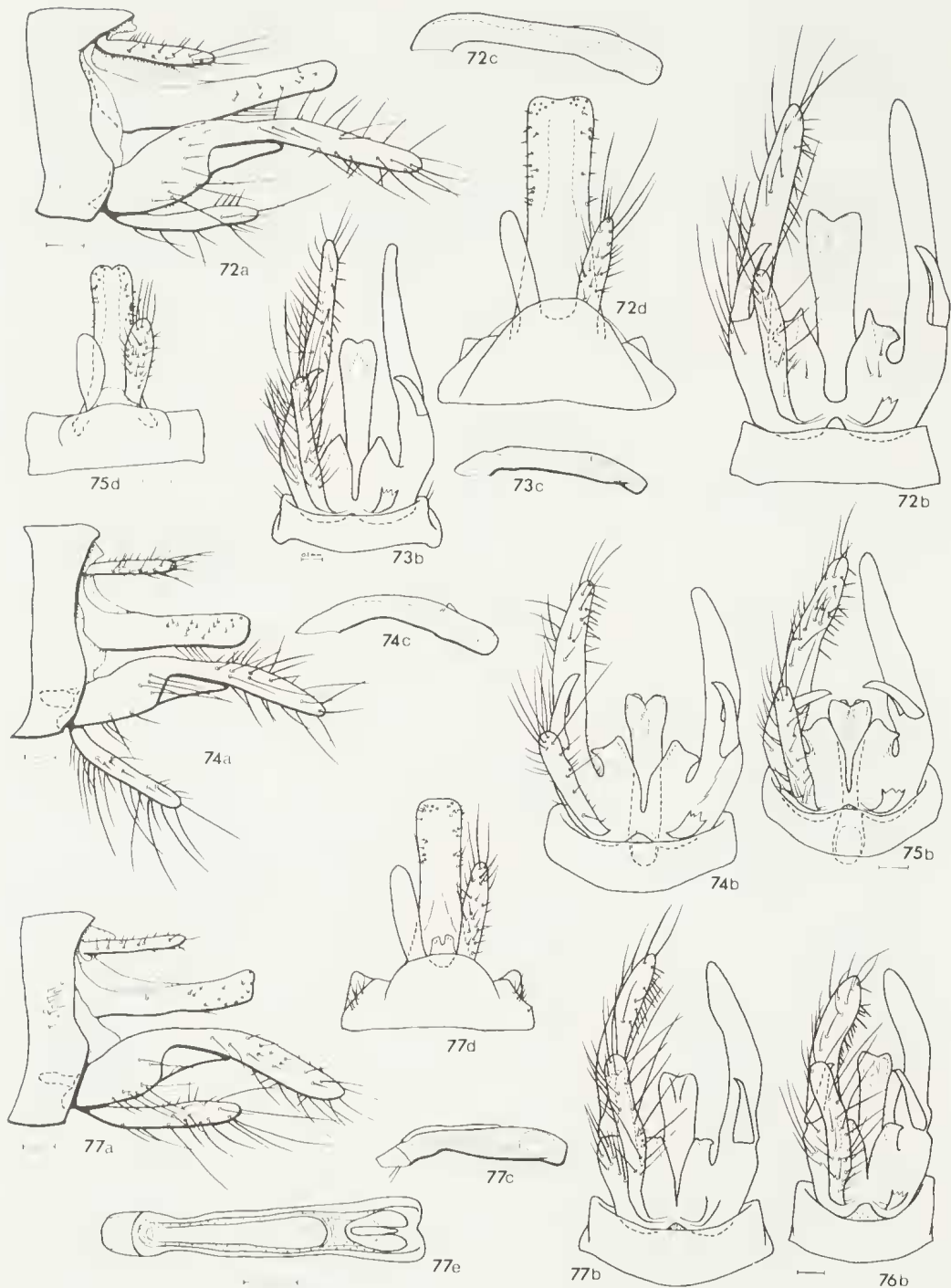
Figs. 64-67. male genitalia: Fig. 64 a, b, c, d, *Triplectides enthesis* Neboiss, holotype, Beedelup Falls, WA; Fig. 65 a, b, c, *Triplectides similis* Mosely large-eyed form, Cowwarr weir, Thomson River, Vic. (PT-818); Fig. 66 a, b,

c, d, *Triplectides similis* Mosely small-eyed form, Porepunkah, Vic. (PT-817); Fig. 67 a, b, c, *Triplectides niveipennis* Mosely, paratype, Yanchep, WA (PT-714).



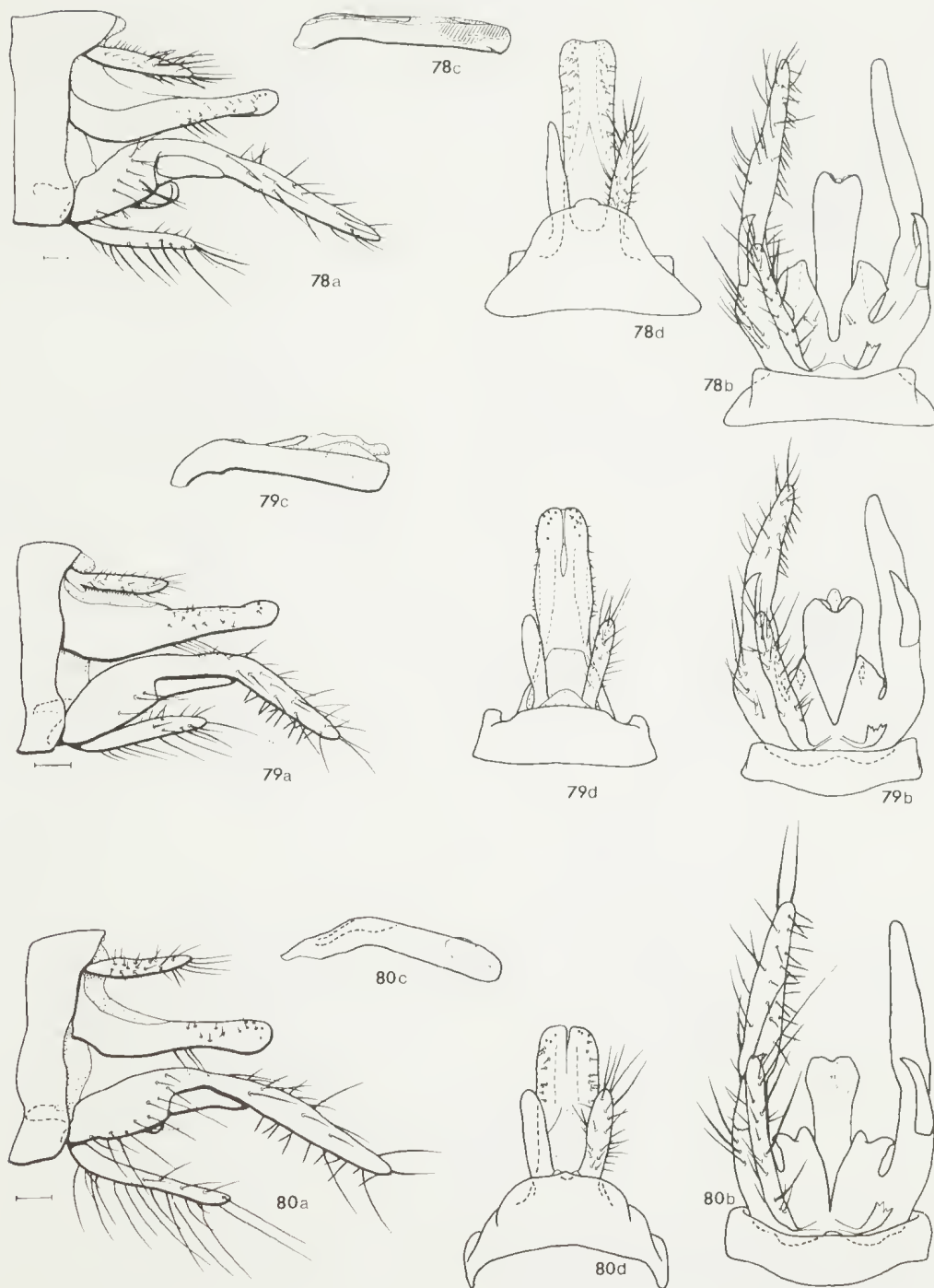
Figs. 68-71. male genitalia: Fig. 68 a, b, c, d, *Triplectides prolatus* Morse and Neboiss, paratype, Crystal Cascades, Cairns, N-Qld. (PT-841); Fig. 69 a, b, c, d, *Triplectides liratus* Morse and Neboiss, paratype, Moses Creek, nr. Mt.

Finnigan, N-Qld. (PT-837); Fig. 70 a, b, c, d, *Triplectides liratellus* Morse and Neboiss, paratype, Babinda, N-Qld. (PT-839); Fig. 71 b, c, *Triplectides varius* Kimmins, Mt. Kosciusko, NSW (PT-846).



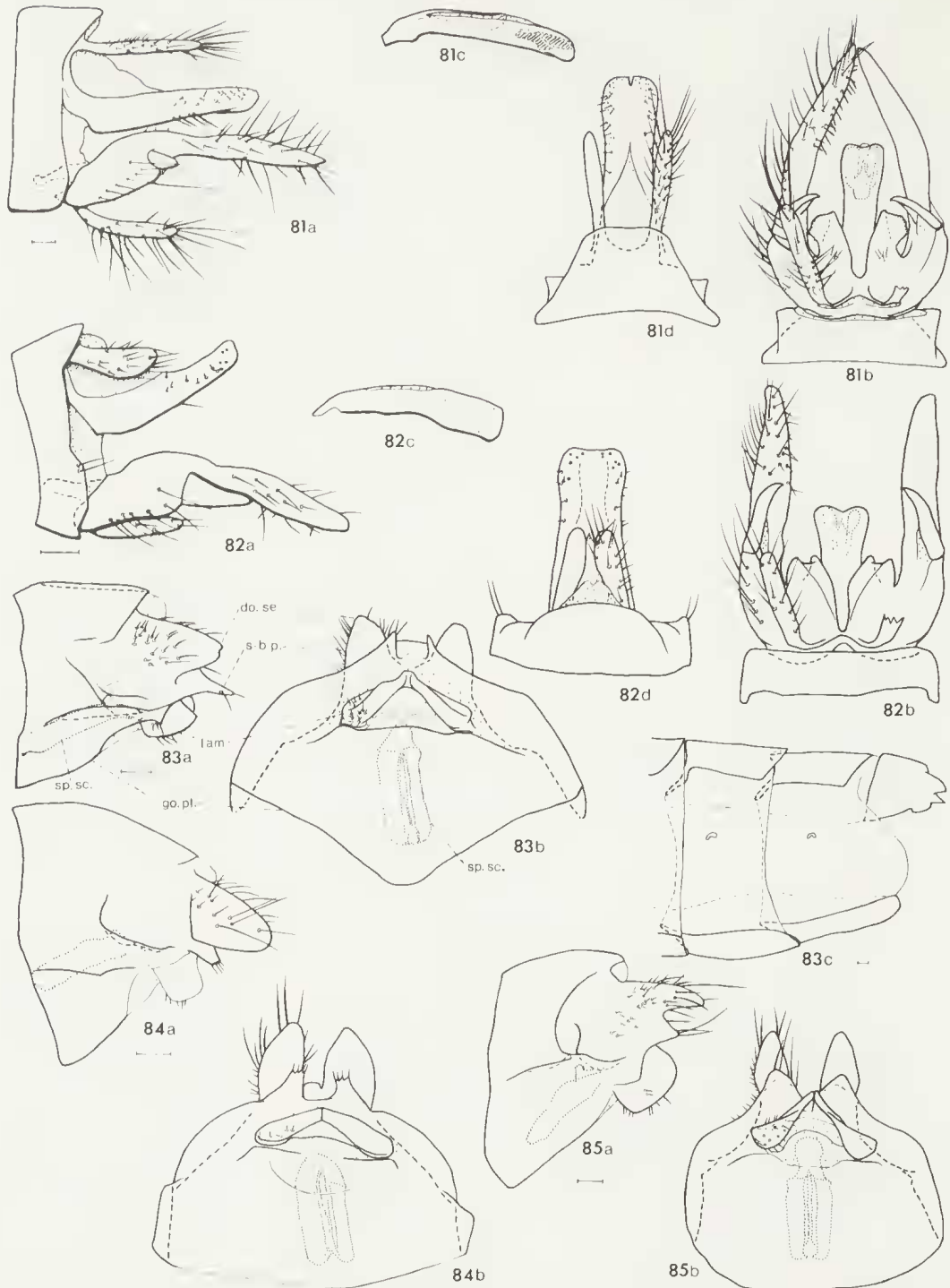
Figs. 72-77. male genitalia: Fig. 72 a, b, c, d, *Triplectides dolabratus* Morse and Neboiss, paratype, Tully Falls, N-Qld. (PT-843); Fig. 73 b, c, *Triplectides elongatus* Banks, Barrington Tops, NSW (PT-853); Fig. 74 a, b, c, *Triplectides truncatus* Neboiss, paratype, Bluff Hill Creek, Marrawah, Tas. (PT-495); Fig. 75 b,

d, *Triplectides truncatus* Neboiss (variety), Olga River, SW-Tas. (PT-851); Fig. 76 b, *Triplectides tambina* Mosely (typical form), Cunningham Gap, SE-Qld. (PT-824); Fig. 77 a, b, c, d, *Triplectides tambina* Mosely variety, Maidenwell, SE-Qld. (PT-845), c-phallus ventral, more enlarged.



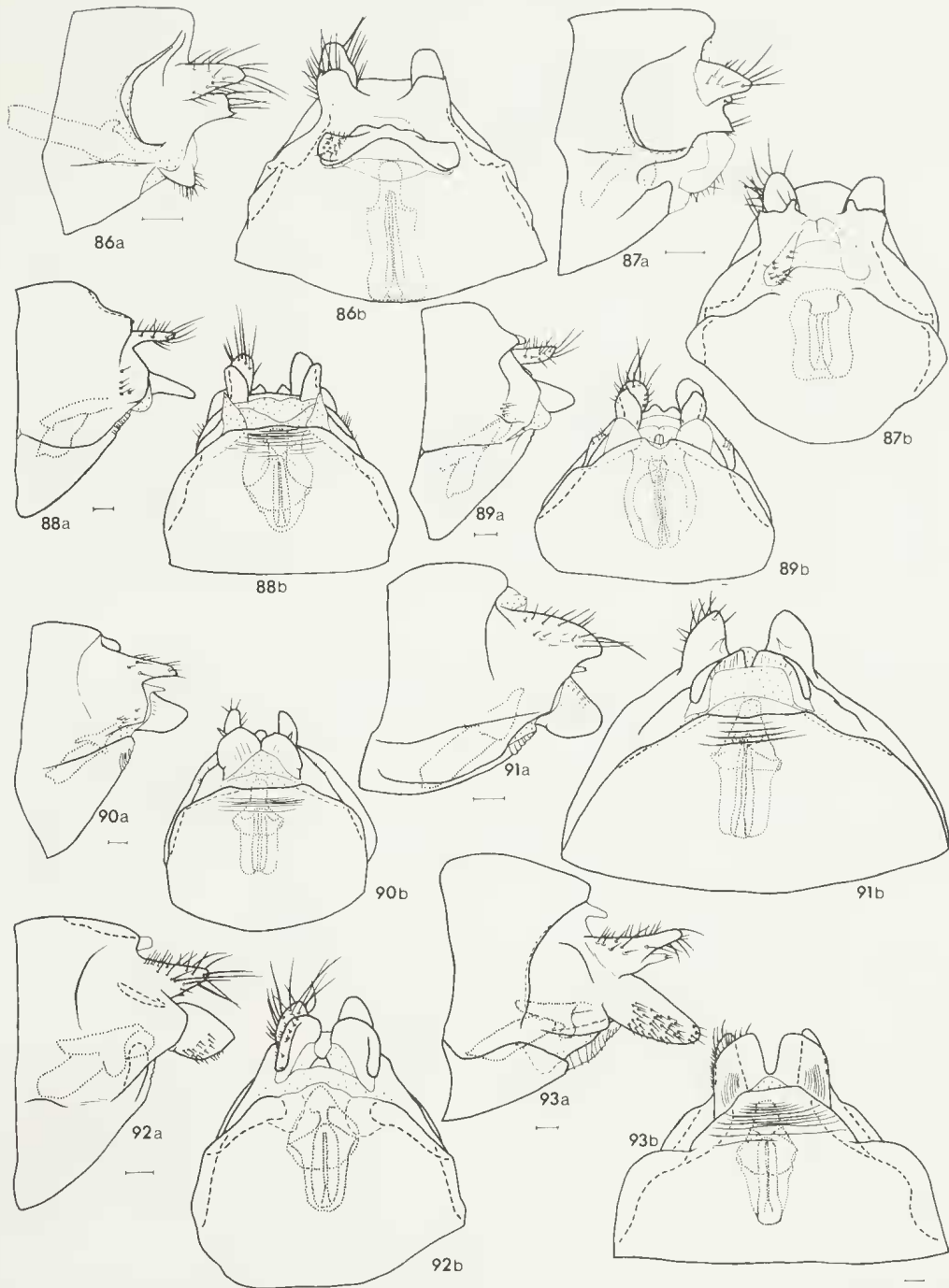
Figs. 78-80. male genitalia: Fig. 78 a, b, c, d, *Triplectides gonetalus* Morse and Neboiss, paratype, Mt. Tiptree, N-Qld. (PT-836); Fig. 79 a, b, c, d, *Triplectides insperatus* Morse and Neboiss,

holotype, Cooloola, SE-Qld. (PT-840); Fig. 80 a, b, c, d, *Triplectides hamatus* Morse and Neboiss, holotype, Upper Manning River, NSW (PT-844).



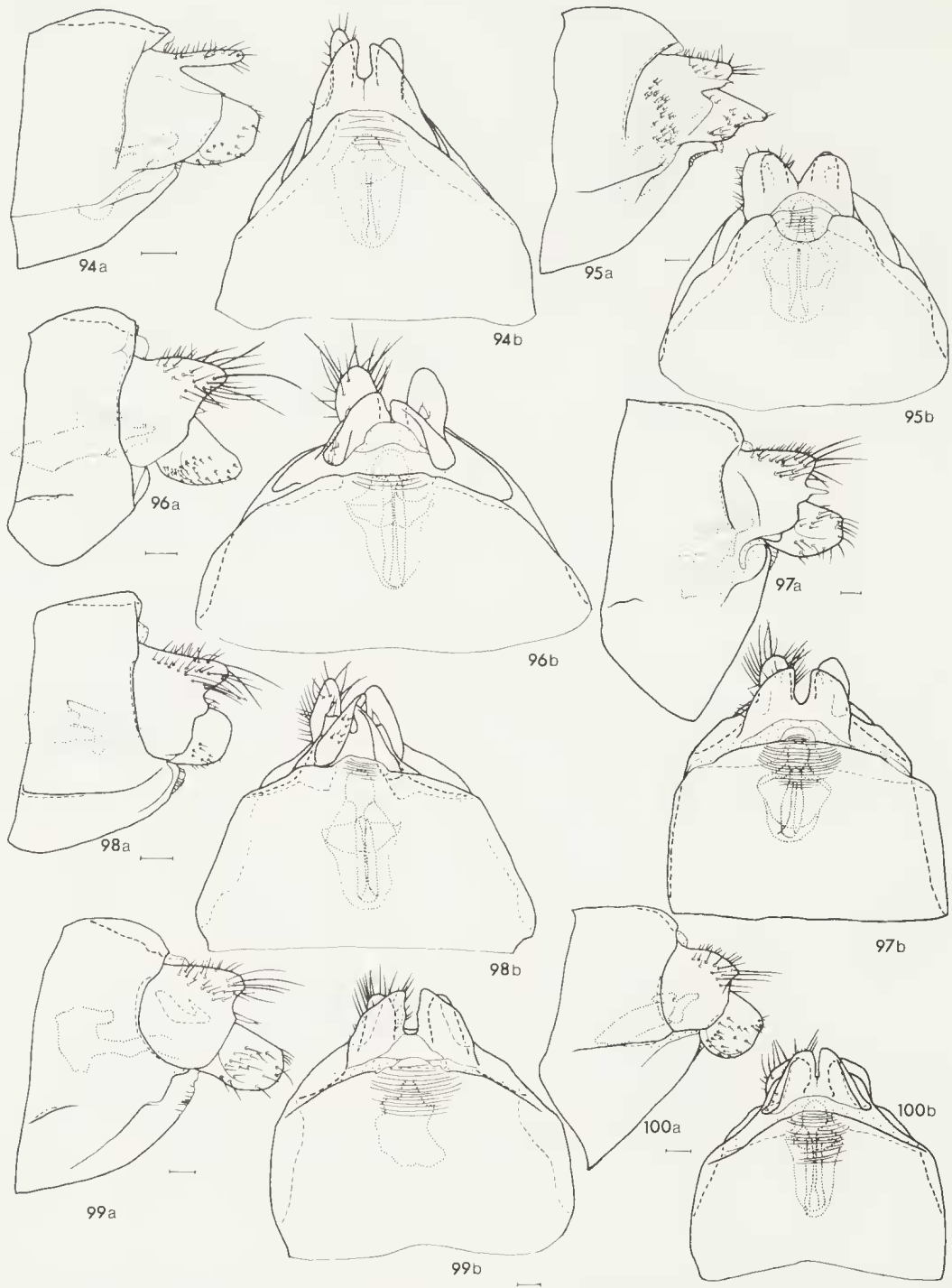
Figs. 81-85. male and female genitalia: Fig. 81 a, b, c, d, *Triplectides altenogus* Morse and Neboiss, paratype, Conondale Range, SE-Qld. (PT-835); Fig. 82 a, b, c, d, *Triplectides rossii* Morse and Neboiss, paratype, Kirrama State Forest, N-Qld. (PT-838); Fig. 83 a, b, *Triplectides australis* Navás, Molong, NSW

(PT-864) female genitalia, c-left lateral view of abdominal segments VII-X; Fig. 84 a, b, *Triplectides helvolus* Morse and Neboiss, paratype, Lambells Lagoon, NT. (PT-866); Fig. 85 a, b, *Triplectides magnus* (Walker), Lake Pedder, SW-Tas. (PT-825).



Figs. 86-93. female genitalia: Fig. 86 a, b, *Triplectides parvus* (Banks), Mt. Webb, N-Qld. (PT-832); Fig. 87 a, b, *Triplectides volda* Mosely, Camp Mountain, SE-Qld. (PT-867); Fig. 88 a, b, *Triplectides bilobus* Neboiss, paratype, Franklin River, SW-Tas. (PT-860); Fig. 89 a, b, *Triplectides proximus* Neboiss, paratype, St. Patricks River, Targa, Tas.

(PT-859); Fig. 90 a, b, *Triplectides australicus* Banks, Cairns, N-Qld. (PT-862); Fig. 91 a, b, *Triplectides ciuskus* Mosely, Orroral River, ACT. (PT-863); Fig. 92 a, b, *Triplectides enthesis* Neboiss, Beedelup Falls, SWA. (PT-878); Fig. 93 a, b, *Triplectides similis* Mosely, Evandale, Tas. (PT-868).



Figs. 94-100. female genitalia: Fig. 94 a, b, *Triplectides liratus* Morse and Neboiss, paratype, Windsor Tableland, N-Qld. (PT-874); Fig. 95 a, b, *Triplectides elongatus* Banks, Kiandra, NSW. (PT-871); Fig. 96 a, b, *Triplectides truncatus* Neboiss, paratype, Bluff Hill Creek, Marrawah, NW-Tas. (PT-496); Fig. 97 a, b, *Triplectides gonetalus* Morse and Neboiss,

paratype, Mt. Misery, W. of Mossman N-Qld. (PT-873); Fig. 98 a, b, *Triplectides tambina* Mosely, Bunya Mts.; Fig. 99 a, b, *Triplectides altenogus* Morse and Neboiss, paratype, Maidenwell, SE-Qld. (PT-872); Fig. 100 a, b, *Triplectides rossi* Morse and Neboiss, paratype, Mt. Fisher, Millaa Millaa, N-Qld. (PT-875).